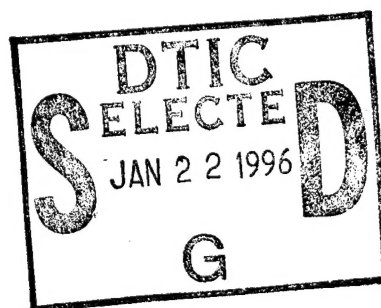


NAVAL POSTGRADUATE SCHOOL MONTEREY, CALIFORNIA



THESIS

JAPANESE MARITIME DEFENSE CAPABILITY IN THE POST COLD-WAR ERA

by

Syojiro Sakagami

June, 1995

Thesis Advisor:

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JAPANESE MARITIME DEFENSE CAPABILITY IN THE POST COLD-WAR ERA

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of the requirements for the degree of

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ABSTRACT

This thesis analyzes the defense capability of Japan Maritime Self-Defense Force(JMSDF) in the post-Cold War era. The primary research question is: “What changes will and should be expected for JMSDF after the collapse of the former Soviet Union?” To answer this question, I reviewed the defense capability buildup program during Cold-War, and made briefly analyzed the relationships among the Asian-Pacific countries, including U.S. Pacific forces and Russia. I also conducted a cost/benefit and personnel analysis of the current fleet configuration and a proposed new configuration. These alternatives may require drastic changes in public attitudes based on serious discussions among the Japanese people and politicians, and a tighter Japan-U.S. relationship on both economic issues and national security burden sharing.

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I. INTRODUCTION

A. BACKGROUND

The end of the Cold War caused a great change in the strategic environment and significantly reduced the possibility of world-scale war. Consequently, the United States, the former Soviet Union, and European countries are promoting plans to further avoid confrontation. A movement towards arms control and disarmament has gained momentum.¹ On the other hand, various local conflicts due to religious or ethnic problems are on the rise in many parts of the world.

In the Asian-Pacific area, however, no major changes similar to those in Europe have occurred. Issues such as the rightful ownership of Japan's Northern Territories, Korean Peninsula, and the Spratly Islands remain even after the end of the Cold War. With regard to the Spratlys' situation, China is trying to modernize its armed forces and strengthen its position in the surrounding area. This is of great concern to nearby countries.

Today, many Southeast Asian countries are increasingly modernizing their forces and purchasing advanced weapons. One could say that this region might present the greatest challenge to peace during the 21st century. Although the Japan-U.S security relationship will continue to be valuable in preserving stability in this region, a shifting American strategy in conjunction with a continued downsizing of American forces in the region could affect Japan's policy.

The Japan Maritime Self Defense Force (JMSDF) is also facing many tough decisions regarding its military budget and strategy. Downsizing and reconfiguration of the JMSDF must take

¹Defense of Japan 1994 (Defense Agency)

into account not only domestic considerations, but also the dynamic and shifting security environment of the region.

B. PURPOSE

The purpose of this thesis is to study JMSDF's future mission and capability in the context of declining Japanese GNP growth, a changing U.S. presence in the Pacific, the diminished Russian threat, and an increased Chinese maritime capability. In contrast to the certainty in the Cold War-era, Japan is facing a more dynamic and potentially uncertain geographical and economic environment. In view of these changing circumstances, this study examines the costs and benefits of various budget alternatives, R&D choices and fleet-mixes for the JMSDF.

The primary research question is what changes will and should be expected for the JMSDF after the collapse of the former Soviet Union?

Three subsidiary questions follow:

1. What will be the JMSDF mission in the post-Cold War period?
2. What will be the JMSDF's budget, R&D and fleet-mix options?
3. What are the resources and political constraints for these options?

C. FRAMEWORK OF THE RESEARCH

1. Outline

This thesis consists of five chapters. Chapter II reviews the defense capability and mission of the JMSDF during the Cold War. Chapter III includes an estimate of the future military balance in East Asia. Chapter IV includes cost/benefit and personnel analyses of alternative fleet configurations and R&D strategies. Chapter V provides findings and a conclusion.

2. Methodology

Data will be collected from the Japan Maritime Staff Office in Tokyo as well as from the Japanese government and commercial publications, and "Military Balance." The military balance in the region will be quantified using data from the JMSDF Staff Office and other open sources.

II. DEFENSE CAPABILITY AND MISSION OF JMSDF DURING THE COLD WAR

A. MILITARY SITUATION AROUND JAPAN DURING THE COLD WAR

The global military situation has developed within the basic framework of military confrontation between the Western and Eastern collective systems, centering respectively on the United States and the Soviet Union. This focus dominated from the end of W.W.II until the collapse of the Soviet Union. During the Cold War, the Soviet Union possessed powerful nuclear forces. In addition, they deployed enormous ground and air forces in their territory, as well as in East European countries and the Far East. To counter the Soviet threat, the United States provided its allies with a so-called "nuclear umbrella." They further deployed ground and air forces to allied countries in Europe and Asia on the Soviet Union's periphery. This signaled their defense commitment to the allies.

Under the aforementioned conditions, the Far East has been an area of great importance in the U.S.-Soviet relationship of military confrontation across the Pacific Ocean. Japan is located at the eastern end of the Far East, on the most vital sea route leading to the Pacific Ocean from the Asian continent thorough the Sea of Okhotsk, the Sea of Japan, the East China Sea, and other adjoining areas. This means that Japan is invaluable in any military confrontation between the U.S and the Soviet Union.

Both geographically and historically, the Korean Peninsula has been intimately related to Japan. Maintenance of peace and stability on the Korea Peninsula has a significant bearing on the peace and stability in Eastern Asia, including Japan. There has been no immediate prospect for peace through dialogue between North and South Korea. More than 1,200,000 ground

personnel from the two countries stand guard against each other across the DMZ.

China has been striving to modernize its equipment. This rapid modernization presents an increasingly difficult condition. Though the relations between China and the Soviet Union have shown signs of improving in recent years, no basic change had been observed in the military confrontation between the two countries.

B. THE SIGNIFICANCE OF SEA POWER AND JMSDF'S MISSION

Japan relies heavily on others for its supply of resources, energy, food and other materials that are vital to its existence. Therefore, defending its surrounding sea areas and securing the safety of maritime traffic are extremely important. Secure lines of communication provide a foundation for its national existence. During the Cold War, it was believed that Japan's maritime traffic would be obstructed by attacks on ships sailing around Japan and by the mining of Japanese ports and harbors using Soviet submarines, aircraft, and surface ships.

Therefore, JMSDF needs to maintain safety for maritime traffic by foiling the advance of enemy forces and reducing their strength. The JMSDF also needs to effectively block enemy operations through surveillance, escort operations and extensive defense measures for ports, harbors, and straits.

The JMSDF has the following missions in order to achieve these objectives:

- In surrounding water areas, anti-submarine units (fixed-wing anti-submarine patrol aircraft) will patrol wide areas, while destroyers will patrol key shipping lanes to gain control of enemy ships deployed in the ocean to attack Japanese shipping. In addition, destroyers and anti-submarine units will escort ships whenever necessary. While patrolling in Japan's territorial waters and

escorting ships, the JMSDF will wage anti-submarine, anti-surface ship and air defense warfare.

- In coastal areas, mine sweeping units, anti-submarine patrol units, (chiefly anti-submarine helicopters), and destroyers deploy in and around key ports and harbors where shipping traffic is particularly thick, to secure the safety of ships. In this case, anti-submarine and mine warfare will be waged appropriately to counter the enemy threat.

- In key straits, destroyers, submarines, and anti-submarine aircraft will wage anti-submarine, anti-surface ship, and mine warfare against enemy ships attempting to force their way through such straits.

- In air operations at sea, destroyers will carry out air defense operations to protect ships.²

C. DEFENSE CAPABILITY BUILD-UP PROGRAM DURING THE COLD WAR

After World War II, Japan was occupied by the Allied powers, and its military system was dramatically reformed, including disbanding the armed forces. Among the Allied Powers, the Soviet Union maintained its massive military might and spread its influence and military control over East European countries and other areas. In spite of the U.S., the Soviet Union increased troop mobilization and built-up its military. Because of this, the free world countries sensed a crisis and formed the North Atlantic Treaty Organization (NATO) with the United States at its core. At the same time, the Soviet Union strengthened its alliance and sphere of influence by establishing the Warsaw Pact Organization (WPO).

1. The 1950's

The Korean War broke out in 1950, amid the currents of East-West confrontation. Since the U.S. Forces stationed in Japan were deployed to the Korean Peninsula, Japan formed the National Police Reserve Force to maintain public security. The Peace Treaty with the U.S. and the Japan-U.S. Security Treaty

²Defense of Japan 1994(Japan Defense Agency) p83

were signed in 1951. Japan restored its sovereignty and started as a new member of the free world. The National Police Reserve Force merged with the Maritime Guard Force into the National Safety Agency. The Defense Agency and the Self Defense Force (SDF) were instituted in Japan to protect against direct or indirect invasion.

Japan adopted its "Basic Policy for National Defense," which later served as the primary guideline for defense policies (see Appendix A). Based on these policies, Japan formulated a series of defense build-up programs to establish a defense foundation.

The 1st Defense Build-up Plan (1958-1960) focused on increasing the mainstay of the defense establishment by improving the ground defense capability. It also developed some maritime and air defense capabilities. This plan served to offset the reduction of U.S. land forces stationed in Japan, which were being rapidly re deployed. This program's achievements are presented in Table 1.³

Basic unit	
Anti-submarine Surface-ship Units(for mobile operations)	3 escort flotillas
Anti-submarine Surface-ship Units(district units)	5 divisions
Submarine Units	-
Minesweeping Units	1 minesweeping flotilla
Land-based Anti-Submarine Aircraft Units	9 divisions
Main Equipment	
Anti-Submarine Surface Ships	57 ships
Submarine	2 Submarines
Combat Aircraft	(approx. 220 aircrafts)

Sources: Defense of Japan 1994

Table 1. Achievements of the 1st Defense Build-up Plan.

³Defense of Japan 1994 (Defense agency) p106

2. The 1960's

Two significant changes occurred in this decade. First, the U.S. and the Soviet Union began negotiations and collaboration to avert confrontation of critical proportions. The 1962 Cuban missile crisis⁴ served as the momentum. These efforts crystallized in the Limited Nuclear Test Ban Treaty, signed in 1963, and the Strategic Arms Limitation Treaty (SALT I), signed in 1972, among others. However, the East-West confrontation continued.

Second, an inclination toward multi-polarization became obvious in both the East and West camps. In 1966, France withdrew from NATO to pursue its own military policies. NATO itself changed from a unilateral reliance on the United States to cooperation between the United States and West European countries. Due in part to a downturn in its economic might, the United States began to seek increased defense participation by its allies, to lessen its own defense burden. In the East camp, the Sino-Soviet conflict surfaced and became increasingly intense. Moves toward liberalization in East Europe were contained after the military interference in Czechoslovakia in 1968 by the Soviet Union and its allies.⁵

Given an atmosphere ripe for conflict, the 2nd Defense Build-up Plan (1962-1966) was formulated with its main focus on improving the defense capabilities. This plan's goal was to counter a small, conventional invasion of Japan. The scale of the hypothetical invasion was smaller than that of a local war.

The 3rd Defense Build-up Plan (1969-1971) continued this objective. To attain this goal, the plan improved and

⁴In the crisis, it was learned that the Soviet Union was installing medium-range missiles in Cuba, and the United States forced the Soviet Union to withdraw the missiles by conducting a maritime blockade and other measures against Cuba.

⁵Defense of Japan 1994 (defense Agency) p107

reinforced the quantity and quality of the Ground, Maritime and Air Self-Defense Forces considering diverse conditions at home and abroad.

Regarding Japan-U.S. security, a strong military posture added support to the U.S. military's right to be stationed in Japan. Therefore, Japan proposed revising the treaty so that the Japanese military could realistically be developed in time of war. The treaty was subsequently revised into its current form and signed in 1960.

The results of the second and third Defense Build-up Plans are presented in Tables 2 and 3.⁶

Basic unit	
Anti-submarine Surface-ship Units(for mobile operations)	3 escort flotillas
Anti-submarine Surface-ship Units(district units)	5 divisions
Submarine Units	2 divisions
Minesweeping Units	2 minesweeping flotilla
Land-based Anti-Submarine Aircraft Units	15 divisions
Main Equipment	
Anti-Submarine Surface Ships	59 ships
Submarine	7 Submarines
Combat Aircraft	(approx. 230 aircrafts)

Sources: Defense of Japan 1994

Table 2. Achievements of the 2nd Defense Build-up Plan.

⁶Defense of Japan 1994 (Defense Agency)

Basic unit	
Anti-submarine Surface-ship Units(for mobile operations)	4 escort flotillas
Anti-submarine Surface-ship Units(district units)	10 divisions
Submarine Units	4 divisions
Minesweeping Units	2 minesweeping flotilla
Land-based Anti-Submarine Aircraft Units	14 divisions
Main Equipment	
Anti-Submarine Surface Ships	59 ships
Submarine	12 Submarines
Combat Aircraft	(approx. 240 aircrafts)

Sources: Defense of Japan 1994

Table 3. Achievements of the 3rd Defense Build-up Plan

3. The 1970's

In the first half of the 1970's, dialogue between the United States and Soviet Union made headway, and East-West relations developed some stability through so-called "détente." Under these circumstances, the 4th Defense Build-up Plan(1972-1976) was formulated. However, the numbers of tanks, ships, and aircraft in this plan were scaled back in 1975. This revision was necessary because of deteriorating economic and fiscal situations after the first oil crisis.

The "National Defense Program Outline" was formulated in 1976, based on the current international situation. It considered recruiting problems and other domestic factors. The achievements of the 4th Defense Build-up Plan and National Defense Program Outline are presented in Tables 4 and 5.⁷

⁷Defense of Japan 1994 (Defense Agency)

Basic unit	
Anti-submarine Surface-ship Units(for mobile operations)	4 escort flotillas
Anti-submarine Surface-ship Units(district units)	9 divisions
Submarine Units	5 divisions
Minesweeping Units	2 minesweeping flotilla
Land-based Anti-Submarine Aircraft Units	16 divisions
Main Equipment	
Anti-Submarine Surface Ships	60 ships
Submarine	15 Submarines
Combat Aircraft	(approx. 240 aircrafts)

Sources: Defense of Japan 1994

Table 4. Achievements of the 4th Defense Build-up Plan

Basic unit	
Anti-submarine Surface-ship Units(for mobile operations)	4 escort flotillas
Anti-submarine Surface-ship Units(district units)	10 divisions
Submarine Units	6 divisions
Minesweeping Units	2 minesweeping flotilla
Land-based Anti-Submarine Aircraft Units	16 divisions
Main Equipment	
Anti-Submarine Surface Ships	60 ships
Submarine	16 Submarines
Combat Aircraft	(approx. 240 aircrafts)

Sources: Defense of Japan 1994

Table 5. Achievements of the National Defense Program Outline

4. The 1980's

The Soviet Union initiated domestic reforms (perestroika, etc.) under the leadership of Mikhail Gorbachev in 1985. A policy of collaboration was adopted with the West. As a result, arms control and disarmament between the West and East progressed, slowing the expansion of the Soviet Union's influence on Third World countries.

The democratization of East European nations progressed rapidly. In 1989, the Berlin Wall collapsed, and the "end to the Cold War" was declared at the U.S.-Soviet summit in Malta. The Warsaw Pact Organization (WPO) was dissolved in 1991, and the Soviet Union itself subsequently disintegrated.

III. FUTURE MILITARY BALANCE IN EAST ASIA

The end of the Cold War greatly changed the strategic environment. The United States, the former Soviet Union, and European countries made plans to reduce and restructure surplus war supplies. These countries moved away from an East-West confrontation and towards arms control and disarmament.

On the other hand, various local regional and ethnic disputes, previously constrained under the East-West confrontation, began to surface or expand. Some countries in the Asian-Pacific area still faced complex military issues and difficult decisions based on their visions of national security. There were still many unsettled issues, such as the Korean Peninsula, the Spratly Islands, and Japan's Northern Territories. A major movement towards peace initiatives, like that which occurred in Europe after the Cold War, has not taken place in the Asian-Pacific Area. 'Asian Security' says:

Changing circumstances, however, have made it necessary to examine the stresses being put on relations in Asian Security.

The time is ripe for considering where international relations in the Asian-Pacific region are headed and what type of regional system would be desirable.⁸

Against this background, many countries have been trying to improve and modernize their defense capabilities. As 'Asian Security' notes:

Asian countries have moved in exactly the opposite direction. Their defense budgets have risen in actual terms, with much of the increase going towards the purchase of new weapons systems. These trends have led to concern that an arms race is now underway in Asia.⁹

If so, what is the future military balance in East Asia?

⁸ASIAN SECURITY 1994-1995 (Research Institute For Peace and Security) pl.

⁹ASIAN SECURITY 1994-1995 (Research Institute For Peace and Security) pl3.

Answering this problem requires discussing the military situation in countries which have influence in the Asian-Pacific area, including: the United States, Russia, China, South Korea and North Korea.

A. THE UNITED STATES

The end of the Cold War caused a great change in the strategic environment and reduced the possibility of world-scale war. The United States promoted plans to avoid further confrontation. A movement towards arms control and disarmament gained momentum. However, some of the same issues still remain to be solved among the Asian-Pacific countries as existed during the Cold War.

The United States has remained committed to protecting her own interests and those of her allies in the Asian-Pacific area. The deployment of the Pacific Command, a unified command consisting of Army, Air Force, Navy, and Marine Corps units, has served as a deterrent to conflict.

The Bush administration adopted the "East Asia Strategic Initiative" (EASI) and made it clear that the U.S. would continue to maintain bilateral arrangements and forward-deployed forces. In November 1991, U.S. Secretary of Defense Cheney stated six principles concerning U.S. strategy in East Asia, as follows:

- Guarantee of U.S. commitment to the Asian-Pacific region.
- A strong framework of bilateral security arrangements.
- Maintenance of a forward deployed presence of highly competent forces, though not big in scale.
- Ensuring enough bases overseas to support forward deployed forces.
- Greater responsibility of Asian allies for their own security.

· Complementary defense cooperation with the allied countries in the region even after the end of the Cold War.¹⁰

The Clinton administration has stated that the U.S. will maintain its involvement and a strong military presence in this region.¹¹ According to the "Bottom-Up Review" announced in 1993, the U.S. will continue to deploy nearly 100,000 military personnel in East Asia, including the Marine Corps and Air Force in Japan, and the Seventh Fleet in the Western Pacific.

However, 'Asian Security' says, "Despite U.S. assurances that the U.S. Military will remain engaged in Asia, there is a chance that the U.S. defense budget, domestic difficulties, and/or isolationist pressures will cause a larger and quicker departure of U.S. forces than expected."¹²

Figure 1 shows the trend of the U.S.'s major naval forces deployed in the Pacific from 1985 to 1993. Figure 1 illustrates the reduction of naval forces in spite of the U.S.'s strategic statements (see Appendix B).

¹⁰Defense of Japan 1992 (Defense Agency) p45

¹¹ASIAN SECURITY 1994-1995 (Research Institute For Peace and Security) p47.

¹²ASIAN SECURITY 1993-1994 (Research Institute For Peace and Security) p56.

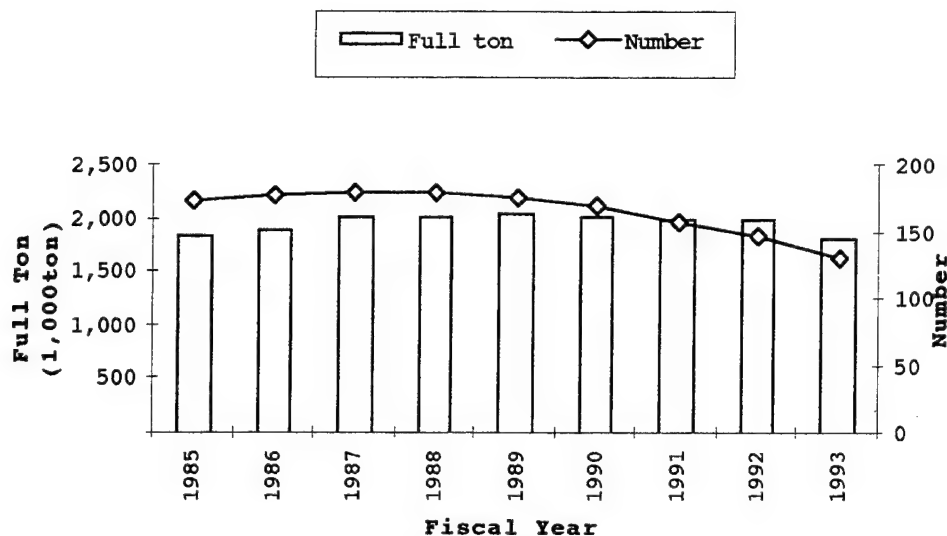


Figure 1 . Major U.S. Naval Forces Deployed in the Pacific:
1985-1993

B. RUSSIA

Since the collapse of the Soviet Union, Russia has been in a transitional period, shifting from totalitarianism to democracy and from socialism to capitalism. In this environment, the Russian military has faced serious problems. There has been considerable debate concerning the new military doctrine and adjusting to the post-Cold War security environment. Defense Minister Grachev described the military doctrine that the Russian Security Council eventually adopted as follows:

The new doctrine emphasizes preventing/deterring war in the absence of any identified potential external threats, and the use of military forces for defensive purpose only. The major purpose of Russian military forces is to protect Russia's vital national interests (the conventional order, sovereignty, and territorial integrity) from military threats.¹³

¹³ASIAN SECURITY 1994-1995 (Research Institute For Peace and Security) p 71.

Russian military forces are to be organized around two major principles. According to 'Asian Security:'

First, strategic nuclear forces will be maintained to deter nuclear and conventional war at the global level. In the event that Russia is attacked with conventional weapons by another nuclear state it will consider nuclear retaliation, but it will also consider such a defense against non-nuclear states belonging to a military bloc that includes nuclear-armed states. Russia has reserved this right to resort to nuclear weapons for defensive purposes because it will not be able to provide a non-nuclear defense against the West's high technology weapons.

The second major principle is to prevent, or contain, local or regional wars by maintaining highly mobile military forces (officially known as Constant Readiness Troops [CRT]). Russia intends to reduce the size of its military to 1.5 million men. The establishment of the CRT force is expected to compensate for the reduction in size.¹⁴

In the middle of November 1993, President Yeltsin mentioned special measures to allow Russia to catch up with the West in high-technology. Yeltsin was concerned, among other things, with the Western precision-guided munitions (PGMs). The Russian military has started to adjust its military doctrine from emphasizing quantity to focusing on quality. This is evident in the continuous modernization of forces in the Far East.

1. Nuclear Forces

Strategic nuclear forces in the Far East include ICBMs and strategic bombers deployed along the Siberian railway, and ballistic missile mounted nuclear submarines (SSBNs), such as Delta III-class nuclear submarines carrying SLBMs, deployed in the sea area centering on the Sea of Okhotsk. The ICBM has been modernized in the form of the SS-25 and others. The mainstay of the strategic bomber is the TU-95, which can carry AS-15 cruise missiles with a range of about 3,000 kilometers. With regards to SSBN's, old subs are coming out of service, but the readiness posture is maintained.

¹⁴ASIAN SECURITY 1994-1995 (Research Institute For Peace and Security) p71.

2. Ground Forces

Russian ground forces in the Far East region have been reduced in scale since 1990, and at present their strength totals 27 army divisions with approximately 240,000 personnel. Part of the army divisions have recently been reorganized as machine-gun and artillery divisions, which are central to regional defense. Some other reduced divisions in which the fill-ratio of personnel is less than 5 percent while equipment is almost 100 percent, have been transformed into mobilization bases, where the divisions can be restored to a full-fledged ordinary division by returning personnel level to fighting strength. In qualitative development, state-of-the-art T-80 tanks have been sent to the region since 1990. Modernization also continues with the development of such equipment as armed infantry combat vehicles, multiple-launch rocket vehicles, heavy artillery, and armed helicopters.

3. Naval Forces

The Pacific Fleet, the largest of the former Soviet Union's four naval fleets, is primarily based in Vladivostok and Petropavlovsk. The Pacific Fleet is comprised of approximately 745 ships with total displacement of about 1,890,000 tons, which include some 65 major surface ships. It also includes about 70 submarines (including 50 nuclear submarines) with an aggregate displacement of approximately 650,000 tons.

In recent years, the Pacific Fleet has been on the decline in quantitative terms, with two aircraft carriers being taken out of service, and its activity toned down. But it has continued to be modernized with the addition of Oscar-II-class cruise missile-mounted nuclear submarines and construction of Akula-class nuclear-powered attack submarines. The Pacific Fleet also has Ivan Rogov-class and other amphibious assault landing ships, the Ro/Flo type large transport ship "Anadyr" with a cargo capability of about 10,000 tons, and a naval infantry division. This provides significant amphibious operation capabilities. Furthermore, the fleet possesses LASH and Ro/Ro commercial ships, both of which can be diverted for military purposes.

4. Aviation Forces

Russia deploys approximately 1,220 combat aircraft in the Far East. Although the number of such aircraft has decreased, the quality continues to improve as the disposition of fourth-generation fighters. Incidentally, some third-generation fighters, which were taken out of service, are considered to be in storage without being scrapped.¹⁵

¹⁵Defense of Japan 1994 (Defense Agency) p43.

Figure 2 shows major Russian naval forces in the Far East from 1985 to 1994. This figure illustrates the quantitative decrease in ships during this period (see Appendix C for total Russian Naval Forces).

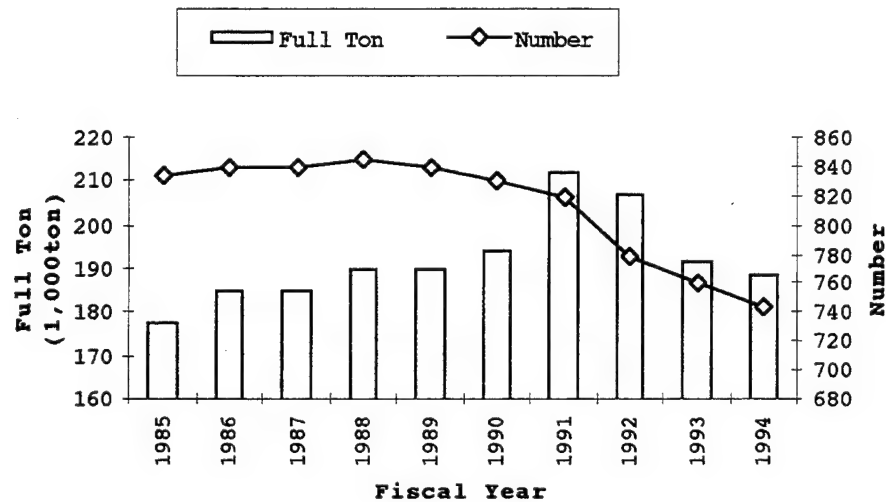


Figure 2. Major Russian Naval Force in Far East: 1985-1994

C. CHINA

After the end of the Cold War and the collapse of the Soviet Union, China suddenly looks more threatening.¹⁶ China is taking advantage of a buyer's market in Russian equipment and is beginning to expand into the void left by the scaled-down U.S. presence. Last year the Chinese finally claimed all the disputed Spratley Islands as sovereign territory and are reinforcing their island garrisons. They are also basing squadrons of newly-acquired Russian fighter bombers within striking range.

Concerning China's future, 'Asian Security' states that:

Two schools of thought have sprung up concerning China's future. Some analyses see disruption developing with China possibly

¹⁶Jane's Information Group, *Jane's Fighting Ship 1994-1995*, Butler and Tanner Ltd., London, 1988.

splitting up, while others predict that China will become a 21st century superpower. These two scenarios, which initially appear contradictory, do not necessarily preclude one another. China may indeed suffer a period of dislocation, but it could then right itself, becoming an economic and military superpower.¹⁷

In August 1993, Liu Huaqing's vision for the Chinese military was published in the Chinese journal 'Qiushi (Seeking Truth)' and in a newspaper published by the PLA (People's Liberation Army), 'Jiefangjun Bao (Liberation Army Daily).' His vision is certain to be an important contribution to discussions on China's choice of strategy. He delineated the limits for the use of military forces, and focused attention on the necessity of defending Chinese air, land and sea areas. Similarly, on July 31, 1994, Chi Haotian suggested adopting a military strategy and a national security policy that emphasizes territorial defense.

From this evidence, it appears that Chinese military leaders do not think China is currently prepared for a large-scale conflict. The Chinese military intends to modernize as necessary to fight a modern war with state-of-the-art military technology.

Chinese military leaders are emphasizing developing the Navy and Air Force.¹⁸ The foreword of 'Jane's fighting ship 1994-1995' states:

Rumors that China is building an aircraft carrier at Kuznetsov class carrier Varyag, building at Nikolayev, proved to be inaccurate, but there is no doubt that a multi-aircraft platform is a high priority naval requirement. A helicopter carrier, possibly a merchant conversion, is a more likely first step. But as Chinese and Russian commercial links appear to be strengthening, anything is possible, and transformation of second-hand ships can happen very quickly. An expansionist maritime policy is not an option given the current state of Fleet training and equipment. Nonetheless the Navy is a credible

¹⁷ASIAN SECURITY 1994-1995 (Research Institute For Peace and Security) p 75.

¹⁸ASIAN SECURITY 1994-1995 (Research Institute For Peace and Security) p96.

force in coastal regions and in support of land forces, and building a 'quality Navy' is now a stated Chinese objective.¹⁹

Figure 3 shows the major Chinese naval forces from 1985 to 1994. This figure illustrates that despite the decline in the number of ships, full tonnage increased after FY1991 (see Appendix D). China seems to have shifted to constructing larger ships that can accommodate ship-borne helicopters. During 1991, the first ship-borne helicopter force began operating as a formal detachment of the Navy.²⁰

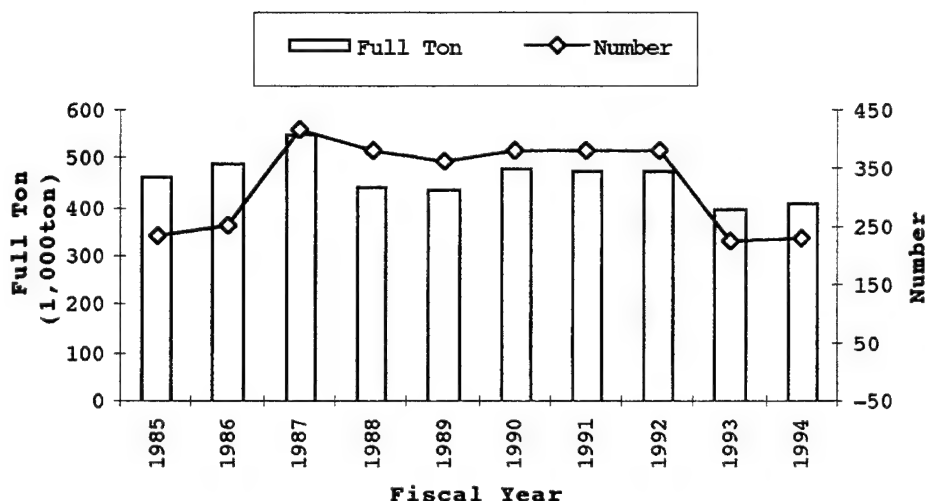


Figure 3. Major Chinese Naval Forces: 1985-1994

D. SOUTH KOREA

The Republic of South Korea has several national security concerns: its capital is situated very close to the demilitarized zone (DMZ), it is surrounded by sea on three sides, and it has numerous inlets along its long coastline. More

¹⁹Jane's Information Group, *Jane's fighting ship 1994-1995*, Butler and Tanner Ltd., London, 1995.

²⁰ASIAN SECURITY 1992-1993 (Research Institute For Peace and Security) p94.

recently, the threat of nuclear weapons has grown, with North Korea refusing to allow inspections by the International Atomic Energy Authority. South Korea has been spending around 4 percent of its GNP on national defense every year, concentrating on North Korea's enormous ground forces as the major threat. 'Jane's Fighting Ship' states:

The South Korean Navy is speeding up its submarine program, giving unusual publicity to the launch last October of the first hull built by Daewoo, while the first of the class which was built in Germany is already in service. The Koreans are not having problems building advanced submarines that have plagued countries such as India and Argentina. The KDX frigate program has been much less dynamic and has suffered countless delays. And it may now be overtaken by a new operational requirement for a much larger class of air defense destroyer. As an interim measure, more Ulsan class are being built. More mine hunters are also under construction. The first two LSTs are to start sea trials at the end of 1995.²¹

In addition, South Korean military forces include 22 ground divisions with about 550,000 personnel, two marine divisions, and an Air Force with about 490 combat aircraft, including F-16 fighters(see Appendix E).

Figure 4 shows major South Korean naval ships from 1985 to 1994. This figure illustrates an increase in the number of ships since 1988 (see Appendix F).

²¹Jane's Information group, Jane's fighting ship 1994-1995, Butler and Tanner Ltd., London, 1995.

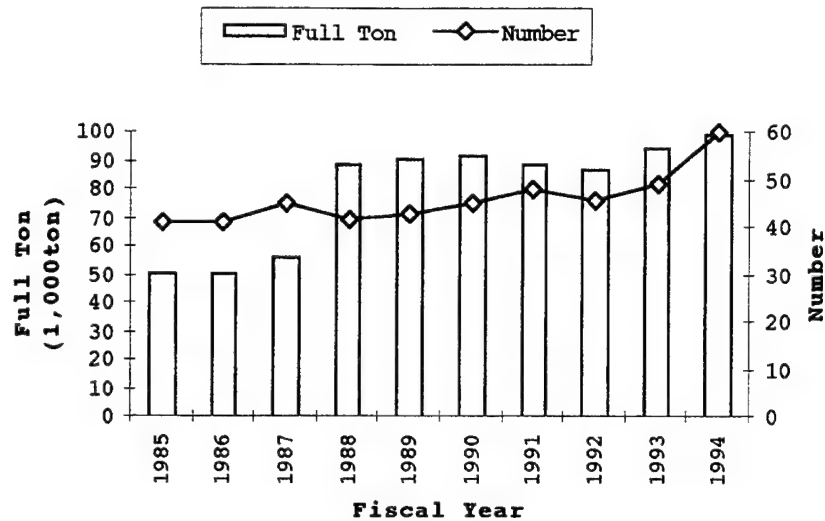


Figure 4. Major South Korean Naval Forces: 1985-1994

E. NORTH KOREA

North Korean military forces have been enhanced since 1962 under a four point military philosophy.²² Although North Korea may be suffering from a serious economic downturn, it has allocated a large percentage of national resources to its military forces.

North Korea's military forces consist of 26 ground divisions with about 1 million personnel, a 620 ship Navy with a total displacement of 85,000 tons, and an Air Force with 810 older combat aircraft made in China and the former Soviet Union. The Air Force also includes fourth generation aircraft such as the MIG-29 and the SU-25.

Figure 5 shows the major North Korean naval forces from 1985 to 1994. This figure illustrates that naval forces have been increasing since 1990 (see Appendix G).

²²Four point philosophy means 'the whole people will be armed,' 'the whole country will be fortified,' 'all soldiers will be trained as a cadre,' 'all arms will be modernized.'

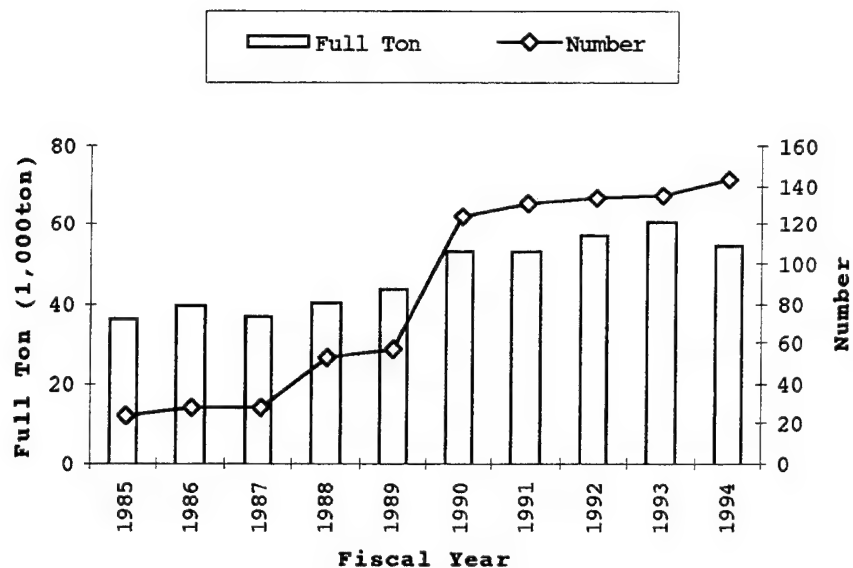


Figure 5. Major North Korean Naval Forces: 1985-1994

F. SUMMARY

Table 6 summarizes the events in the Asian-Pacific countries with security implications since the end of the Cold War. This table indicates that China looks increasingly threatening as the U.S. and Russia withdraw military forces from the Asian-Pacific area. 'Strategic Assessment 1995' states:

Specifically, the Chinese leadership seeks to use diplomatic means and the specter of improving PLA military capabilities to put teeth into Chinese claims in the South China Sea.²³

²³Strategic Assessment 1995 (INSTITUTE NATIONAL STRATEGIC STUDIES) P2.

YEAR	DATE	EVENTS
1989	17-May	Gorbachev announces the reduction of 120,000 Soviet Far Eastern forces, etc.
	4-Jun	Chinese security forces crack down on demonstrators at Tienamen Square.
	29-Sep	Vietnam declares it has withdrawn troops from Cambodia.
	9-Nov	GDR permits free departures to the West (Virtual demolition of the Berlin Wall)
	2-Dec	U.S.-Soviet summit talks(Malta, till Dec.3)
1990	18-Jan	The Soviet Foreign military announces the complete withdrawal of MiG-23s and TU-16s from
	15-Mar	Gorbachev becomes the first Soviet president.
	4-Sep	North and South Korean prime ministers meet in first high-level contact (Seoul, till Sep.7)
	30-Sep	Soviet Union and South Korea establish diplomatic relations.
1991	2-Jan	Soviet Defense Minister Yazov announces virtual completion of unilateral reduction of 500,000 Soviet troops.
	28-Feb	U.S. DoD submits to Congress " A strategic Framework for the Asian Pacific Rim."
	15-May	Chinese Communist Party General Sectretary Jiang Zemin visits Soviet Union. Sino-Soviet agreement on eastern border formally signed.
	10-Jul	Russian President Yeltsin takes office.
	5-Oct	Soviet President Gorbachev announces proposals for reduction in nuclear arms.
	10-Nov	China and Vietnam issue joint statement, declaring normalization of government and party relations.
	18-Dec	South Korea President Roh announces removal of nuclear weapons from South Korea.
	25-Dec	Soviet President Gorbachev Resigns.

Table 6. Defense Annuals in Asian-Pacific Area

1992	7-Jan	South Korea Defense Department announces cancellation of Team Spirit '92.
	29-Jan	U.S. President Bush announces a proposal on nuclear arms reduction.
	29-Jan	Russian President Yeltsin unveils proposal for reduction in CIS armed forces.
	30-Jan	North Korea signs safeguard agreement allowing IAEA inspection of nuclear facilities based on Nuclear Nonproliferation Treaty.
	19-Feb	At the 6th high-level North-South talks, "the agreement on conciliation, non-aggression and exchange cooperation between North and South "and " the joint declaration concerning the denuclearization of the Korea Peninsula" effected.
	25-Feb	China enacts Territorial Water ACT designating Senkaku Islands as integral part of China.
	20-Mar	Russian Foreign Minister Kozyrev says Soviet troops stationed on the Northern Territories were reduced by 30%, though 7,000 brigade-level forces still retained there.
	10-Apr	North Korea-IAEA nuclear safeguard agreement comes into force.
	25-May	IAEA officials make the first special inspection of North Korea's nuclear facilities.
	16-Jun	U.S.-Russia summit meeting, held in Washington, agrees on massive strategic arms reductions.
	30-Jun	Fidel Ramos takes office as president of the Philippines.
	1-Jul	U.S. and South Korea dissolve their joint field army command.
	2-Jul	U.S. President Bush announces the complete withdrawal of ground-and sea-deployed tactical nuclear weapons abroad to the U.S.
	21-Jul	Russian Foreign Minister Kozyrev announces the continued maintenance of former Soviet military facilities in Vietnam's Cam Ranh Bay.
	24-Aug	China and South Korea establish diplomatic relations.
	25-Sep	Russia announces the completion of work to withdraw Russia troops from Mongolia.

Table 6. (continued)

1992	12-Oct	14th National Congress of the Communist Party of China is held(with emphasis on strengthening military forces and defending the sovereignty of territories, territorial waters and the right to and interests of marine resources).
	19-Nov	South Korean and Russian leaders sign the basic treaty between South Korea and Russia.
	24-Nov	U.S. completes withdrawal of its armed forces from the Philippines.
	22-Dec	South Korea and Vietnam establish diplomatic relations.
1993	2-Feb	Malaysia and India sign a memorandum on defense cooperation.
	25-Feb	Kim Young Sam become South Korean President.
	12-Mar	North Korea announces secession from nuclear nonproliferation treaty(NPT).
	13-May	U.S. Defense Secretary Aspin announces the shift of the Strategic Defense Initiative (SDI) Office to the Ballistic Missile Defense (BMD) Organization.
	11-Jun	North Korea reserves withdraw from NPT, in a joint statement issued as a result of the first round of U.S.-North Korea consultation.
	1-Jul	U.S. announces plans to close or reduce U.S. bases at home and abroad.
	10-Jul	U.S. President Clinton announces a concept for a "New Pacific Community" in a speech to South Korea's parliament.
	28-Jul	A high Russian military official confirms withdrawal of MiG-23s from Tennei Airfield on Etorofu Island.
	1-Sep	U.S. DOD announces the "Bottom-up Review."
	5-Oct	China conducts an underground nuclear test.
	19-Oct	China and Vietnam sign an agreement on basic principles regarding the solution of border and territorial issues.

Table 6. (continued)

1994	14-Jan	At a U.S.-Russia summit, the two countries agree to avoid having their strategic nuclear weapons target each other.
	4-Apr	North Korea rejects the U.N. Security Council chairman's statement adopted Mar.31.
	29-Apr	South Korea and Russian defense ministers sign a memorandum on mutual cooperation and military cooperation.
	26-May	U.S. announce a renewal for China is most favored national (MFN) treatment.
	30-May	U.S., Russia and Britain announce releases of their strategic nuclear weapons from attack targets.

Table 6. (continued)

IV. ANALYSIS OF MANPOWER REQUIREMENT AND AN ALTERNATIVE FLEET CONFIGURATION

A. JAPANESE DEFENSE EXPENDITURE

1. Trends in Japanese Defense Expenditure (DE)

The ratio of defense expenditures to GNP has been under 1% since FY1967. The only exception was during the 3-year period from FY1987 through FY1989 in which the ratios were slightly over 1% (see Figure 6 and Appendix H for detail). In terms of trend, the ratio increased during the 1980's and has been decreasing since FY1990.

With regards to the ratio of defense expenditures to the national budget, it decreased from 11.3% in FY1958 to 5.1% in FY1981. From FY1981 to FY1988 the ratio increased to 6.5% then turned down again until FY1993. It settled at 6.4% in FY1994.

In comparison with the growth rate of other major budget items (Social Welfare, Education and Science, and Public Works), the growth rate of defense expenditures exceeded those of other major budget items for the first time in FY1981. This trend continued for nine years until FY1989 (see Figure 7 and Appendix I). However, since FY1991, the growth of defense expenditures decreased relative to all other expenditures. It showed a declining trend as follows; 3.8% in FY1992, 1.95% in FY1993, 0.90% in FY1994 and 0.855% in FY1995.

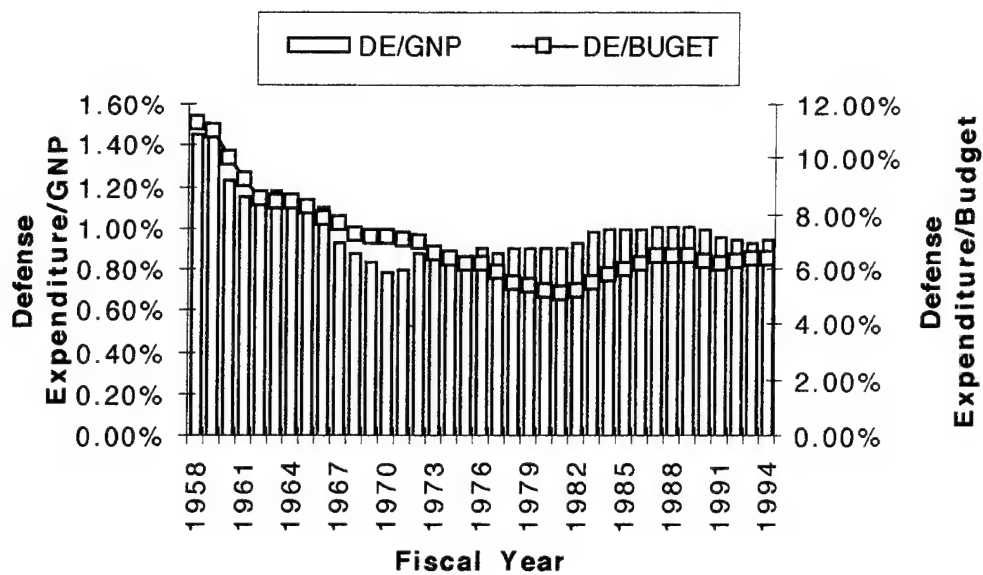


Figure 6. Defense Expenditure/GNP and Defense Expenditure/Budget

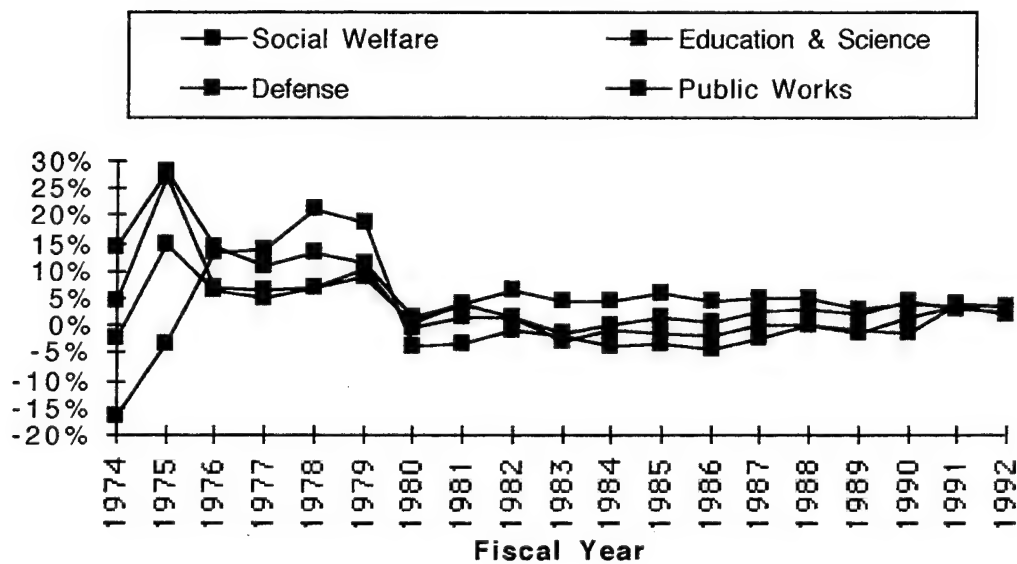


Figure 7. Major Account Growth Rate

2. JMSDF Budget

a. Budget Comparisons Across Services

Figure 8 shows each service's monetary budget from FY1974 to FY1992. This figure is consistent with an average overall budget growth of 5% per year. Figure 9 shows how each service's share of the budget changed from FY1975 to FY1992. In FY1992, JMSDF's portion is 24% of the defense budget and JASDF's portion is about 25% (Appendix J and K).

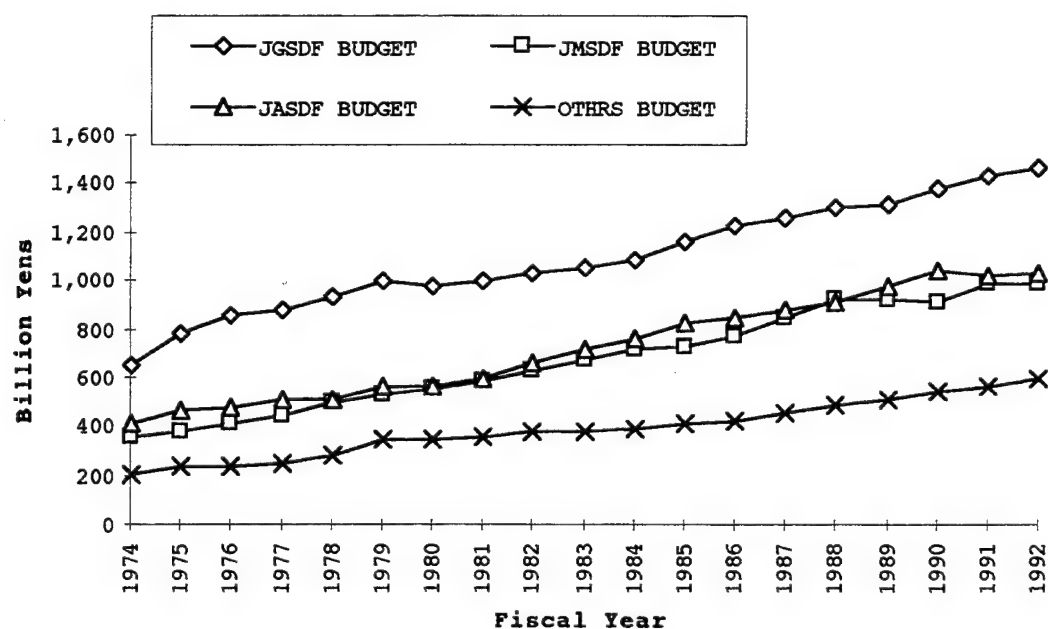


Figure 8. Defense Budget by Service (in 1985 ¥): 1974-1992

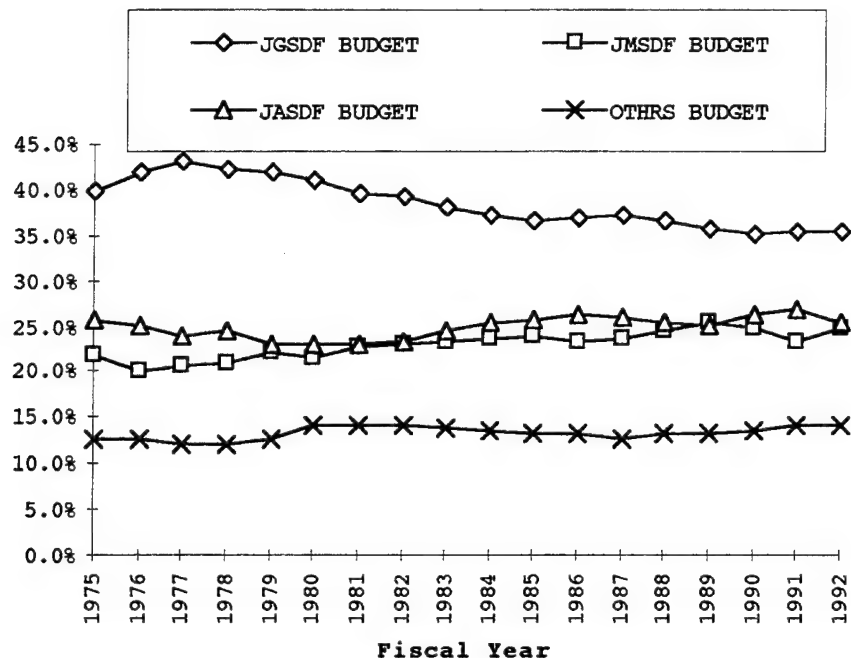


Figure 9. Relative Share of Defense Budget by Service: 1975-1992

b. JMSDF Budget

Figure 10 breaks the total JMSDF budget into its three major expense items: personnel and provisions, current-year obligatory outlays, and current-year materials (see Appendix L). Similarly, the JMSDF budget can be divided into personnel and provisions, front-line expenditures and other expenditures. JMSDF's front-line expenditures include current year spending on ship and aircraft procurement and ammunition. Figure 11 divides JMSDF's front-line expenditures into its components: ships, aircraft and ammunition. Front-line expenditures represent the budget for the Defense Build-up Program. Front-line expenditures exceeded personnel and provision expenses starting in FY1980, with the growth of the Japanese economy. In front-line expenditures, shipbuilding and aircraft procurement grew

srelative to ammunition until FY1980. This means the JMSDF gave higher priority to equipment than to logistics and readiness.

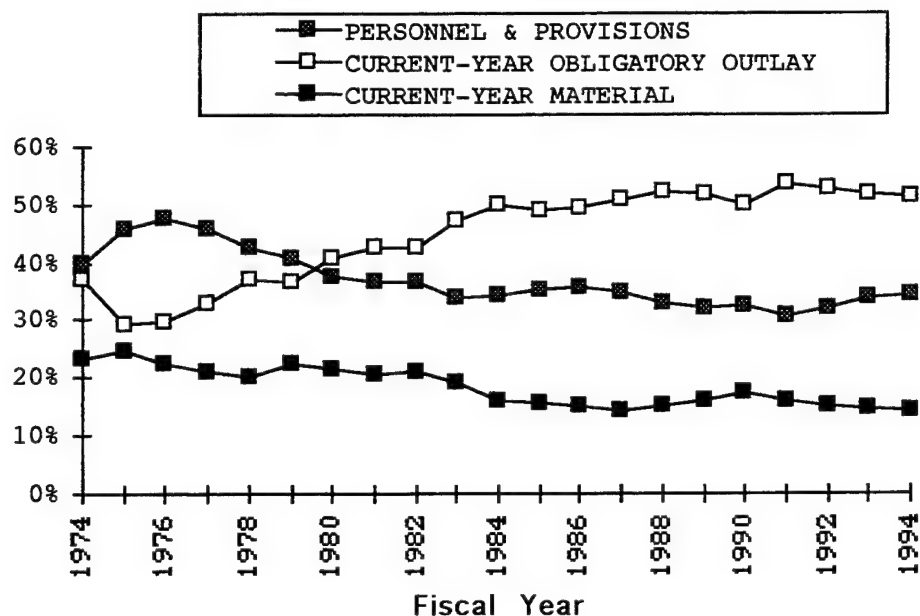


Figure 10. JMSDF Budget by Element²⁴

²⁴ Note: 1. Personnel & Provisions expense indicate payment for wages and meals.
 2. Current-year obligatory outlays expense indicate payment for authorized contract expense and continued projects expense.
 3. Current-year materials expense indicate payment for repair and improvement, training, purchasing oil, etc.

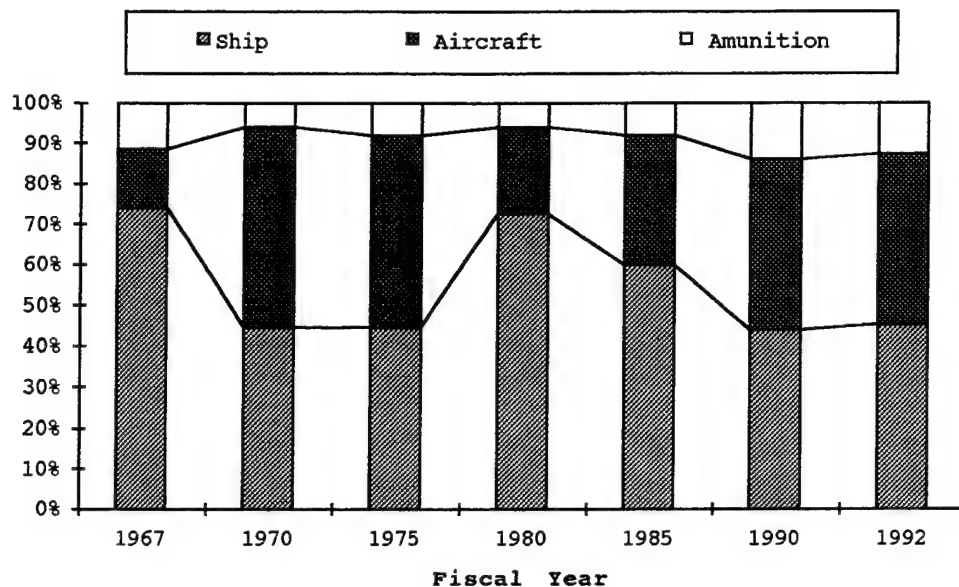


Figure 11. JMSDF Front-Line Expenditures by Component

B. SHIP COST ANALYSIS

1. Shipbuilding Costs

In order to find the trend in shipbuilding costs for each ship type, the cost/displacement for four ship types between the 1960s and 1990s is computed and shown in Figures 12 through 15. The four ship types include: destroyers(DD), guided missile destroyers (DDG), escort destroyers(DE), and submarines(SS).²⁵ The cost is all expressed in constant 1985 year yen.

²⁵ Note: 1. Cost/Ton in these charts are in real Yens, Based on FY1985 prices and using FY1985 deflator.(1,000 yen).
2. Line in the each chart indicates a trend line.

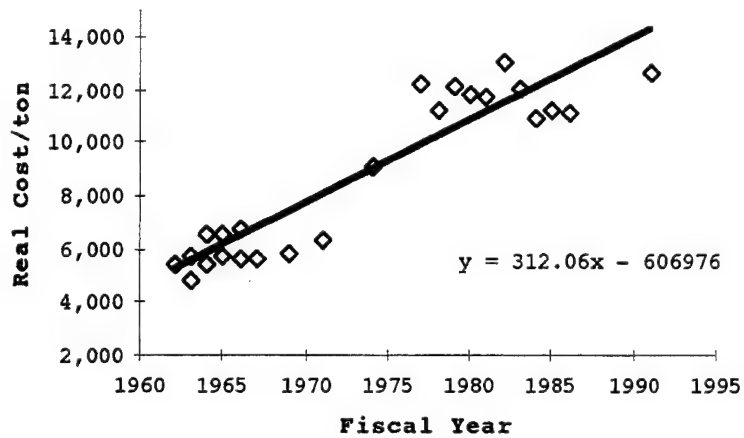


Figure 12. DD Shipbuilding Costs: 1960-1994

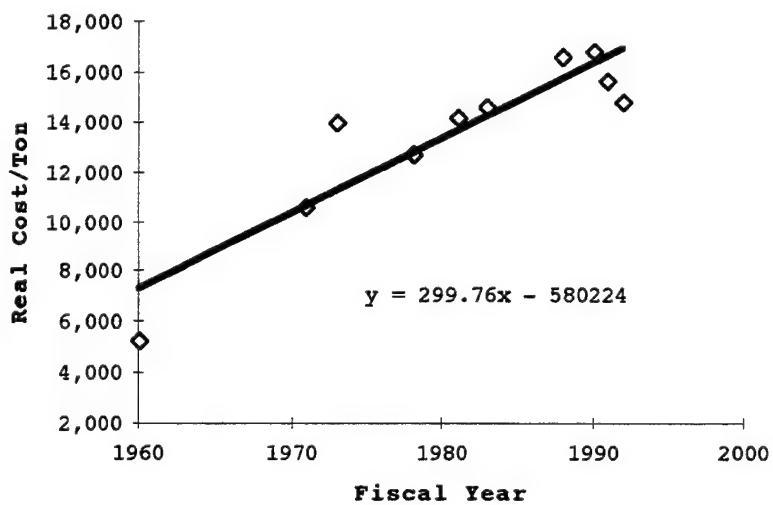


Figure 13. DDG Shipbuilding Costs: 1960-1994

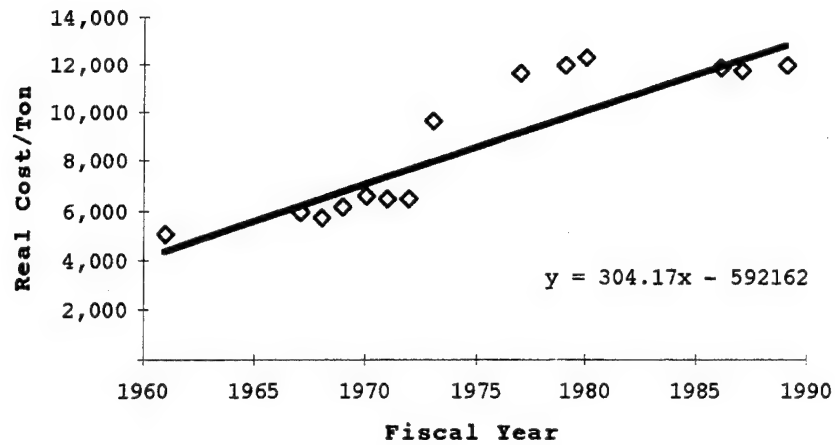


Figure 14. DE Shipbuilding Costs: 1960-1994

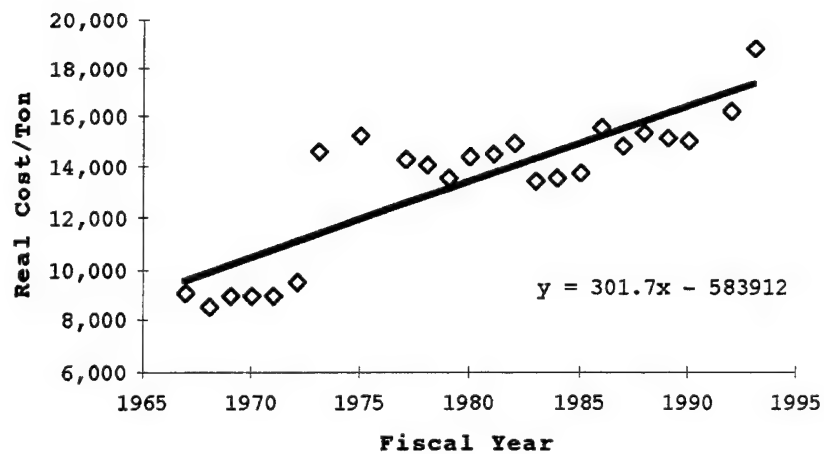


Figure 15. SS Shipbuilding Costs: 1960-1994

The trend data indicates that the real shipbuilding cost per ton displacement on average has increased 3% annually for the last 30 years. The significant portion of the cost increase,

however, occurred around the "Oil Shock" of 1973. The pre-1973 data and post-1974 data suggest a 0.4% annual escalation rate.

2. Personnel Cost

Personnel costs are computed as the annualized sum of salaries, bonuses and on board allowances. All the costs are expressed in constant 1985 year Yen. The annual bonus is approximately 5.4 times the monthly salary. The on board allowance is approximately 27%-33% of monthly salary in the case of surface ships at port, and 48% for submarines and for the sailing allowance. Figures 16-19 show trend in personnel costs for each ship type over the indicated years.²⁶

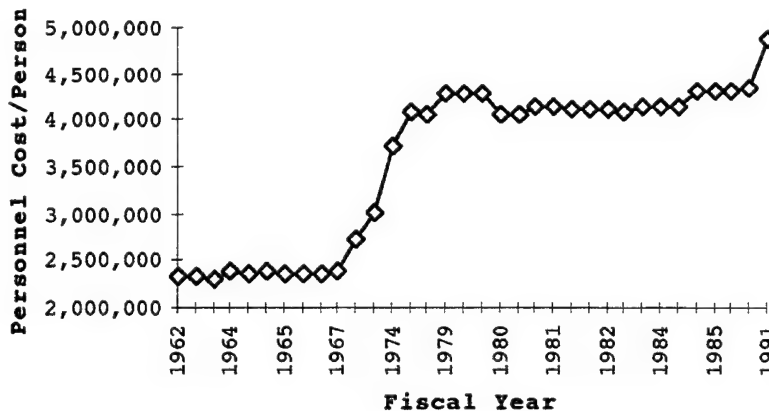


Figure 16. Personnel Cost/Person Aboard a DD: 1962-1991

²⁶ Note: 1. Cost/Ton in these chart are expressed in real Yens, based on FY1985 prices and using a FY1985 deflator.(1,000 yen).
2. Line in the each chart indicates a trend line.

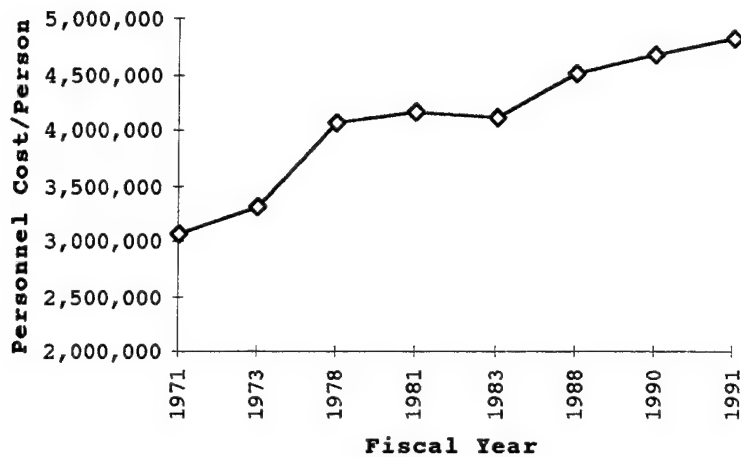


Figure 17. Personnel Cost/Person Aboard a DDG: 1971-1991

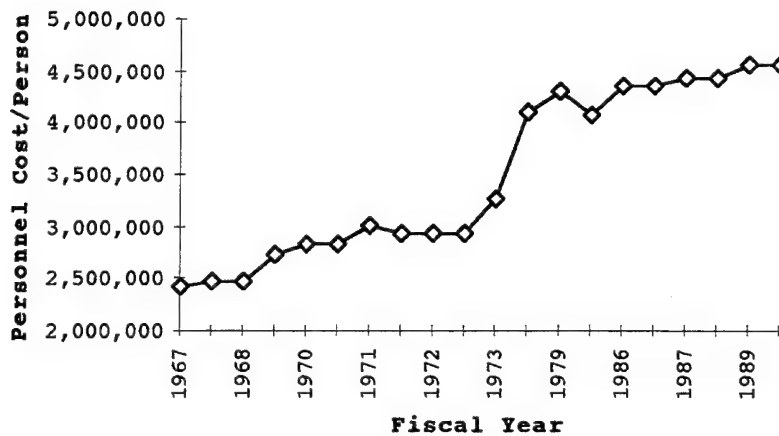


Figure 18. Personnel Cost/Person Aboard a DE: 1967-1991

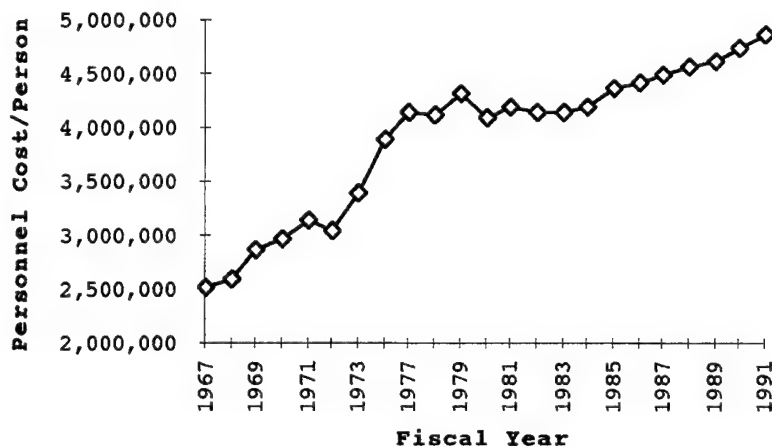


Figure 19. Personnel Cost/Person Aboard an SS: 1967-1991

Here again the major shift occurred around the 1973 Oil Shock. Post-Oil Shock data suggests an annual escalation rate of 0.7 % (see Appendix M).

3. Capital Labor Ratio

In this analysis, the capital labor ratio is computed by dividing the shipbuilding cost by the ship's complement. Tables 7-10 and Figures 20-23 show the ratio for each ship type over the indicated years.²⁷

²⁷ Note: 1. Total Cost is expressed in real Yen, based on FY1985 prices and using a FY1985 deflator.(1,000 yen).
2. Line in graph indicates a trend line.

TYPE	CLASS	PERIOD	NO	DISPLACE- MENT	COMPLE- MENT	PRODUCTION COST(1985\$)	COMP./ DISP.	COST/ DISP.	CAPITAL /LABOR
DD	KUMO	62-74	9	2,050- 2,150	210-220	12,906,948 (1.00)	0.102 (1.00)	6,119 (1.00)	59,837 (1.00)
DD	TSUKI	63-66	4	3,050- 3,100	260-270	19,251,242 (1.49)	0.091 (0.84)	6,236 (1.02)	72,651 (1.20)
DD	YUKI	77-82	12	2,950- 3,050	200	36,507,882 (2.83)	0.067 (0.65)	12,299 (1.99)	184,781 (3.05)
DD	KIRI	83-86	8	3,500- 3,550	220	39,585,223 (3.07)	0.062 (0.61)	11,230 (1.84)	179,924 (3.01)
DD	AME	91-	1	4,400	170	55,914,244 (4.33)	0.039 (0.38)	12,708 (2.08)	328,907 (5.50)

Note: The capital labor ratio of YAMAGUMO(the first KUMO-class) is used as the base for normalization.

Table 7. Change in Capital Labor Ratio for DD Type Destroyers:
1962-1991

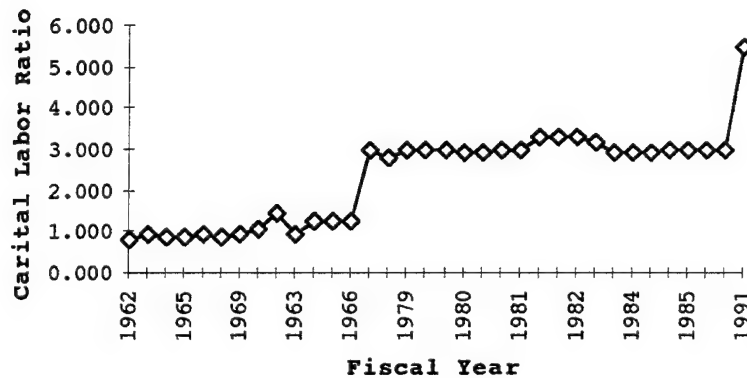


Figure 20. Capital Labor Ratio for DD: 1962-1991

TYPE	CLASS	PERIOD	NO	DISPLACE- MENT	COMPLE- MENT	PRODUCTION COST(1985\$)	COMP./ DISP.	COST/ DISP.	CAPITAL /LABOR
DDG	TACHI- KAZE	60-78	4	3,050- 3,950	250-290	40,128,386 (1.00)	0.072 (1.00)	10,614 (1.00)	157,312 (1.00)
DDG	HATA- KAZE	81-83	2	4,600- 4,650	260	66,541,760 (1.66)	0.056 (0.78)	14,386 (1.36)	255,930 (1.63)
DDG	KON- GOU	88-92	4	7,200	300	114,859,079 (2.86)	0.042 (0.58)	15,953 (1.50)	382,864 (2.43)

Note: The capital labor ratio of TACHI-KAZE(the first TACHIKAZE-class)
is used as the base for normalization.

Table 8. Change in Capital Labor Ratio for DDG Type Destroyers:
1960-1992

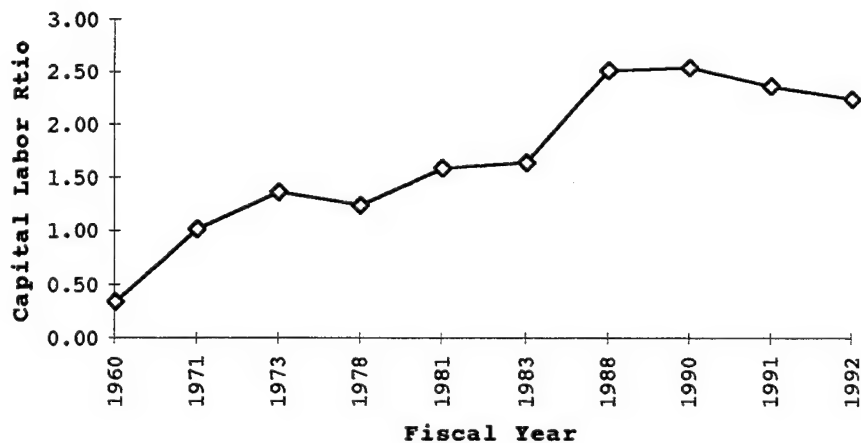


Figure 21. Capital Labor Ratio for DDG: 1960-1992

TYPE	CLASS	PERIOD	NO	DISPLACE- MENT	COMPLE- MENT	PRODUCTION COST(1985\$)	COMP./ DISP.	COST/D ISP.	CAPITAL /LABOR
DE	TIKUGO	67-73	11	1,470- 1,500	160-165	9,756,000 (1.00)	0.11 (1.00)	6,575 (1.00)	59.711 (1.00)
DE	ISHI- KARI	77	1	1,290	90	15,129,044 (1.55)	0.07 (0.59)	11,728 (1.78)	108,100 (2.82)
DE	YU- BETSU	79-80	2	1,470	95	17,881,331 (1.83)	0.06 (0.59)	12,164 (1.85)	188,225 (3.15)
DE	ABU- KUMA	86-89	6	2,000	120	23,781,035 (2.44)	0.06 (0.54)	11,891 (1.81)	198,175 (3.31)

Note: The capital labor ratio of TIKUGO(the first TIKUGO-class) is used as the base for normalization.

Table 9. Change in Capital Labor Ratio for DE Type Destroyers:
1967-1991

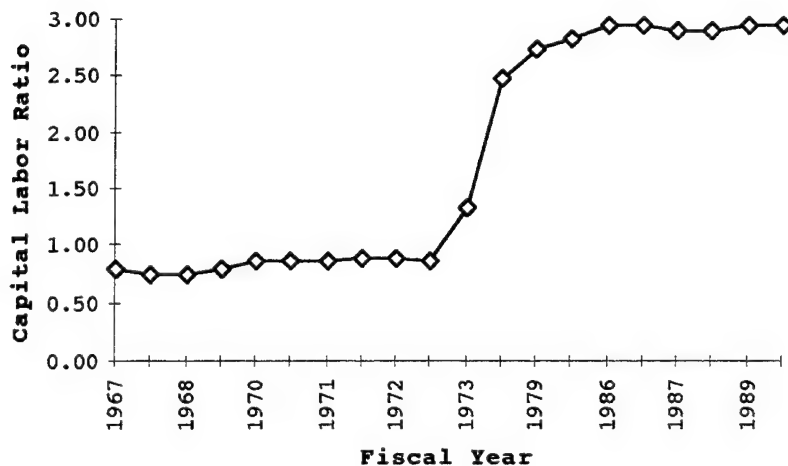


Figure 22. Capital Labor Ratio for DE: 1967-1989

TYPE	CLASS	PERIOD	NO	DISPLACE- MENT	COMPLE- MENT	PRODUCTION COST(1985\$)	COMP./ DISP.	COST/ DISP.	CAPITAL /LABOR
SS	UZU- SHIO	67-73	7	1,850	75	18,159,685 (1.00)	0.041 (1.00)	9,816 (1.00)	242,125 (1.00)
SS	YU- SHIO	75-85	10	2,250	75	31,729,905 (1.75)	0.034 (0.83)	14,230 (1.45)	423,065 (1.73)
SS	HARU- SHIO	86-93	7	2,450- 2,500	75	39,022,740 (2.15)	0.029 (0.72)	15,918 (1.62)	542,778 (2.35)

Note: The capital labor ratio of UZU-SHIO(the first UZUSHIO-class)
is used as the base for normalization.

Table 10. Change in Capital Labor Ratio for SS Type Submarine:
1967-1993

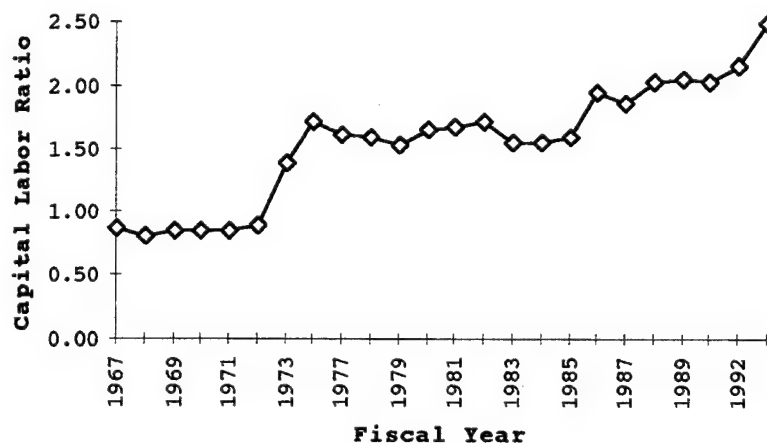


Figure 23. Capital Labor Ratio for SS: 1967-1993

Comparing the capital labor ratio across ship types shows two distinct results: across ship types, there is a distinct shift in trend line before and after 1973; and, the capital labor ratio changes from ship class to ship class. For example, Table 7 and Figure 20 shows that the new Ame Class DD destroyer

exhibits a significantly higher capital labor ratio than the previous destroyer classes, such as the Kiri and the Yuki classes. The higher capital labor ratio reflects investment in high-technology equipment, such as Vertical Launched ASROC (VLA) and Phased Arrey Radar (FAR), to cope with modern warfare. It also demonstrates the effort to contain personnel costs by replacing labor with capital. Table 10 and Figure 23 illustrate the effect of modernization and substitution for submarines.

C. PERSONNEL ANALYSIS

1. The Future Recruiting Population

This section describes demographic trends in the youth population that constitutes potential applicants for military service. Figure 24 shows the relationship between the number of applicants and the number of recruits for the period from 1981-1990.

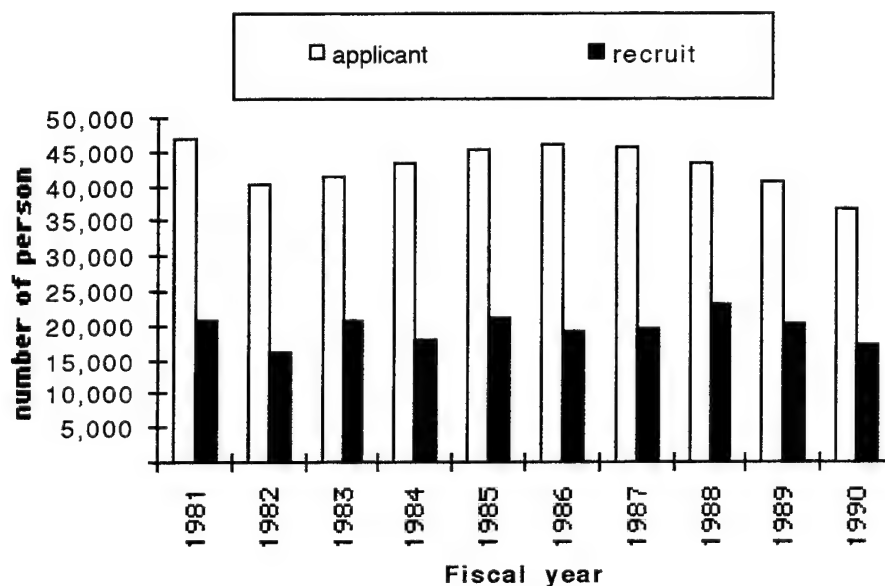


Figure 24. Relation Between Number of Applicants and Recruits: 1981-1990

In 1990, the JSDF accepted about 20,000 personnel out of 40,000 applicants. Since almost all applications for military service come from 18-26 year old males, declines in this population should reduce the number of future applicants, given the current economic conditions and relative compensation levels.

Figure 25 compares the recruit/applicant ratio and economic conditions measured by GNP growth rate, for the period from 1976 to 1993. The recruit/applicant ratio declines when economic conditions turn down. In a recent severe economic downturn, produced the lowest recruits/applicants ratio in the last 20 years. For FY1992 and FY1993, there are four applicants to one recruiting position, which is almost double the historic average.

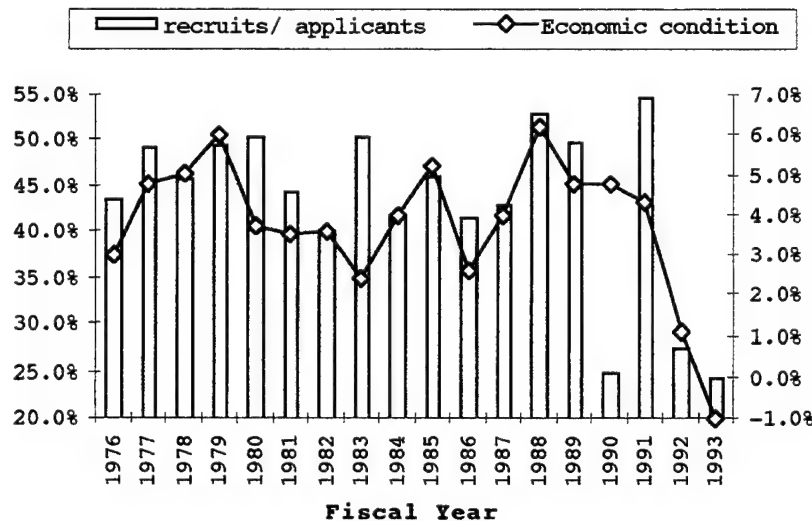


Figure 25. Trend Relation Between Recruits/Applicants and Economic Condition: 1976-1993

Table 11 projects an annual decline of 2.3% for the 15-19 year old male population and 3.6% for females of the same age, between 1991 and 2006.²⁸

		(1,000 persons)					
		MALE			FEMALE		
YEAR	Age	15-19	20-24	15-24	15-19	20-24	15-24
1991		940	3,270	4,210	870	3,260	4,130
1992		914	3,360	4,274	846	3,350	4,196
1993		888	3,450	4,338	822	3,440	4,262
1994		862	3,540	4,402	798	3,540	4,338
1995		836	3,630	4,466	774	3,630	4,404
1996		810	3,720	4,530	750	3,720	4,470
1997		786	3,590	4,376	716	3,610	4,326
1998		762	3,470	4,232	682	3,500	4,182
1999		738	3,340	4,078	648	3,390	4,038
2000		714	3,216	3,930	614	3,280	3,894
2001		690	3,090	3,780	580	3,170	3,750
2002		680	2,996	3,676	560	3,086	3,646
2003		670	2,900	3,570	540	3,000	3,540
2004		660	2,810	3,470	520	2,920	3,440
2006		640	2,620	3,260	480	2,750	3,230

Source: National census, "Population Estimate"

(as of Oct.1 of each year)

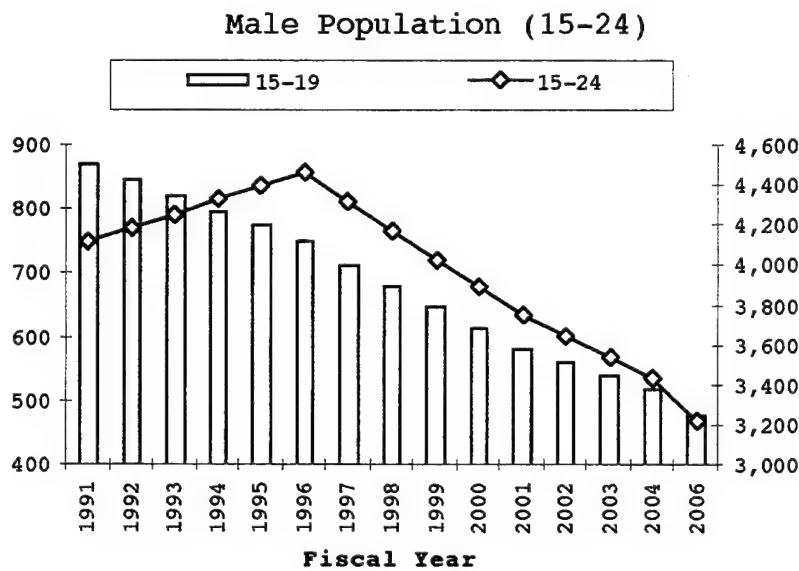
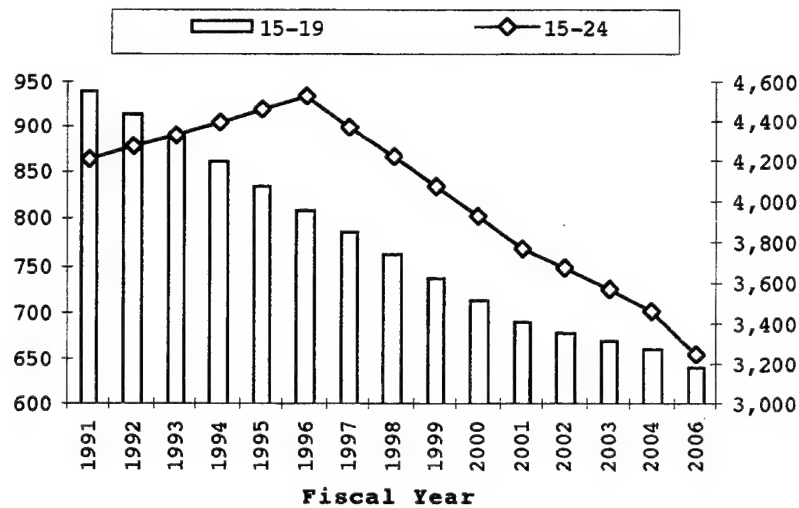
"Future Estimate of Japan's Population"

by Institute of Population Problems,

Ministry of Health and Welfare.

Table 11. The Change in Male/Female Population: 1991-2006

²⁸ Sources : Before 1993 : National census, " Population Estimate" (as of Oct. 1 each year) by Statistic Bureau of Management and Coordination Agency. After 1994 : "Future Estimate of Japan's Population" by Institute of Population Problems, Ministry of Health and Welfare(based on average estimate as of Sept. 1992).



Female Population (15-24)

Figure 26. Population Projections for 15-24 Year Old Youths:
1991-2006

Since most recruits come from the 18-19 year old male category, the expected decline in this population poses a significant future challenge for JMSDF recruiting. Continued

increases in female recruits, better pay and improving the quality of life of the Self Defense Force may be necessary to meet the future requirements.

2. JMSDF Recruits

The average ratio of the JMSDF's recruits to applicants was 5.6% during the past decade. In other words, JMSDF successfully enlisted 5.6% of all applicants to the JSDF (see Appendix N). This is considerably lower than the average ratio for the total Self Defense Force. Figure 27 shows the change in actual JMSDF recruits per year. There is a significant year to year variation. For example, the 300 FY1992 recruits are only one tenth of the recruits in FY1987. Such wide variation could pose interesting skill and age mix problems for the maritime force.

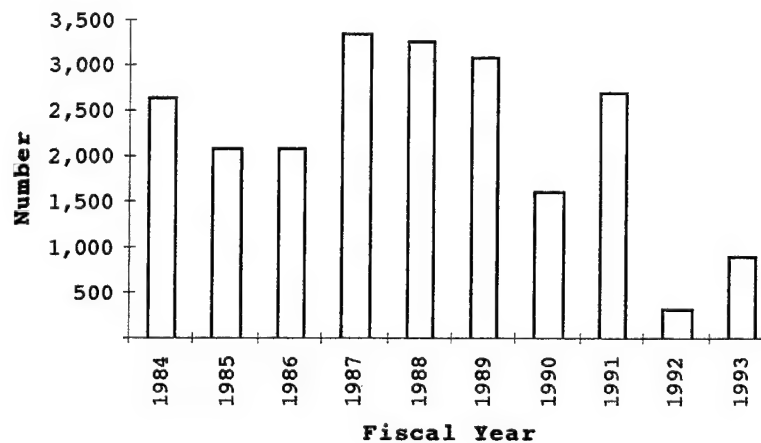


Figure 27. JMSDF Recruits: 1984-1993

Figure 28 vividly illustrates the recent difficulties in attracting the necessary JMSDF recruits, even in poor national economic conditions. JMSDF obtained fewer than 50% of the planned recruits in FY1992 and FY1993.

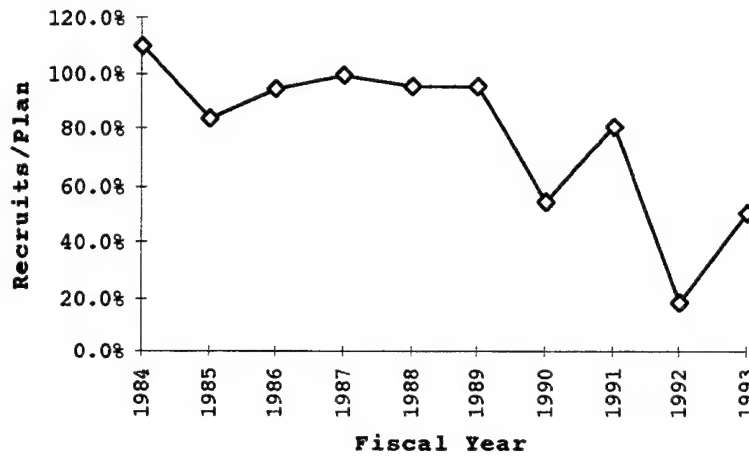


Figure 28. The Ratio of Actual and Planned Recruits: 1984-1993

3. The Changes in JMSDF Ship's Complement

The ratio of a ship's crew to its displacement indicates labor-intensity. Figures 28-31 show this ratio for four ship types over the years indicated (also see Appendix O). These figures show a downward trend in JMSDF ships' complements per displacement ton for each ship type. This decrease coincides with the decreasing youth population, as discussed in the previous section.

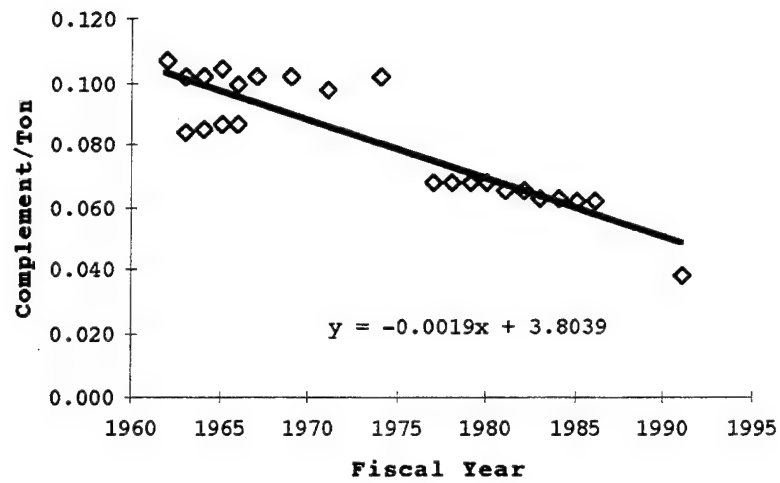


Figure 28. DD Ship's Complement per Displacement Ton:
1961-1991

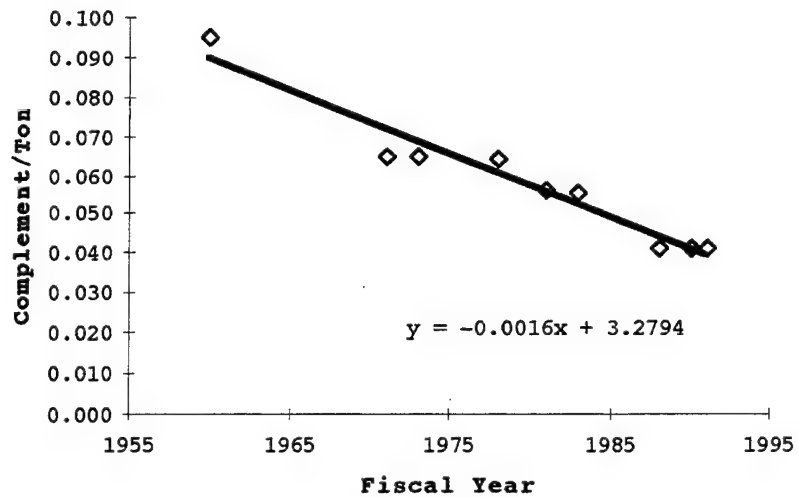


Figure 29. DDG Ship's Complement per Displacement Ton:
1961-1991

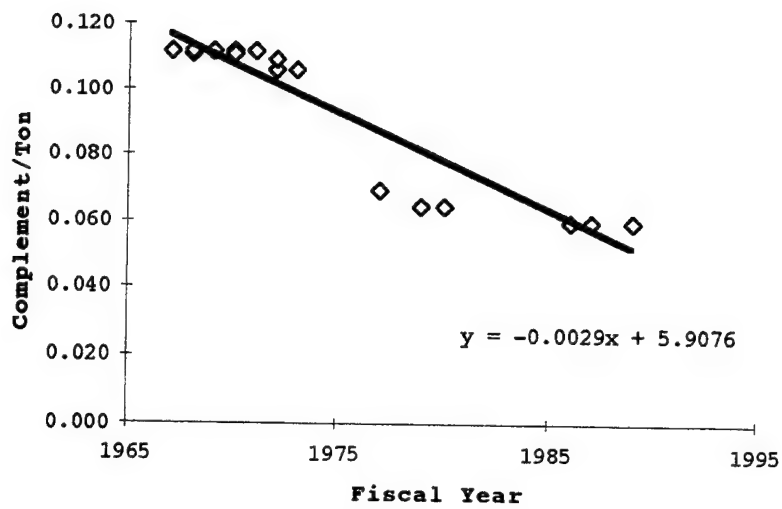


Figure 30. DE Ship's Complement per Displacement Ton:
1966-1991

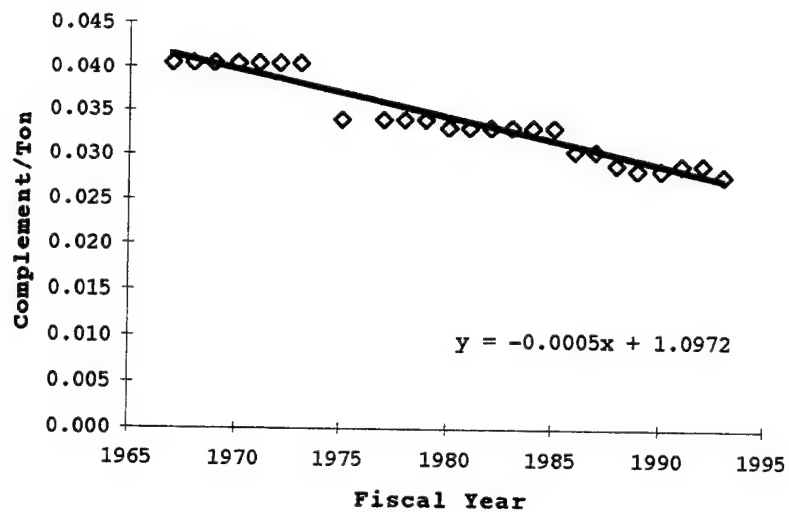


Figure 31. SS Ship's Complement per Displacement Ton:
1966-1991

E. NATIONAL DEFENSE MANPOWER DEMAND

1. The Posture of the JMSDF in the NDPO

The posture of the JMSDF in the National Defense Program Outline (NDPO) is reproduced below.

1. The JMSDF must possess one fleet escort force as a mobile operating ship unit in order to quickly respond to enemy aggressive action at sea. The fleet escort force must be able to maintain at least one escort flotilla on alert at all times.

2. The JMSDF must possess, as ship units assigned to coastal surveillance and defense, surface anti-submarine capability of at least one ship division in operational readiness at all times in each assigned sea district.

3. The JMSDF must maintain submarine units, anti-submarine helicopter units and mine sweeping units, providing the capability for surveillance and defense missions as well as mine sweeping at important harbors and major straits when the need arises.

4. The JMSDF must maintain fixed-wing anti-submarine aircraft units in order to provide the capability of carrying out missions of surveillance and patrol of nearby seas and ship protection.²⁹

Descriptions of the actual scales of organization and primary equipment included in the foregoing concepts are given as attachments. Required inventories are summarized in Table 7.

²⁹ Defense of Japan 1992 (Defense Agency) p247.

<u>Basic Units</u> Anti-submarine Surface-Ship Units (for mobile operation) Anti-submarine Surface-Ship Units (Regional District units) Submarine Units Mine sweeping Units Land-based Anti-submarine Aircraft Units	4 Escort Flotilla 10 Divisions 6 Divisions 2 Flotilla 16 Squadrons
<u>Main Equipment</u> Anti-submarine surface Ships Submarines Combat Aircraft	Approx. 60 Ships 16 Submarines Approx. 220 Aircraft

Table 7. JMSDF Inventory Level as Stipulated by NDPO

2. Estimated Personnel Demand for Ships in NDPO

The JMSDF inventory includes 60 ships, 16 submarines, and 30 mine-sweeping crafts. Both ships' crews and aviation crews are needed to support this inventory. However, ships' crews account for approximately 44% of JMSDF personnel. Thus, trends for ships' crews likely represent the general trend for JMSDF personnel. Figure 32 shows the estimated demand for ships' crews required to maintain about 60 ships. These estimates were calculated based on ships' complement. Complements for new ships are as follows: "MURASAME" type DD (complement: 170); new type SS (complement: 70); MSC (complement: 40); and auxiliary ships same as FY1995 level.

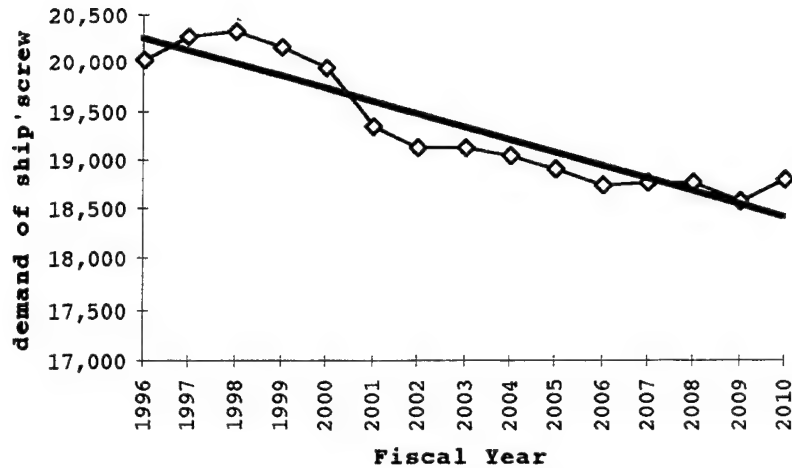


Figure 32. Change in Estimated Demand for Ships' Crew

As shown in Figure 32, the demand for ships' crews is estimated to decline by 0.5% annually. Older ships with larger crew sizes are continually replaced by newer ships with smaller crew sizes. This will continue through the year 2001.

However, the question remains as to whether the lower demand for ships' crews will be met in light of the rapidly decreasing youth population. Earlier, Figure 26 showed that the youth population is expected to decline in the next 10 years by 2.3% for males and 3.6% for females. The larger relative decline in the applicant pool means it will be considerably harder for the JMSDF to fill future recruit requirements.

JMSDF must consider new options to fulfill its future missions. The options include continued on-board manpower-saving measures, increased employment of female and older personnel, improvements in quality of life, and increases in monetary remuneration. The feasibility of increasing monetary

remuneration to attract more JMSDF recruits is examined in the following section.

3. Improvement in Monetary Remuneration

One possible solution involves increasing the JSDF's monetary remuneration. Salaries for a given age group are based on average salaries of their civilian counterparts. One approach to increase JSDF recruits is to double their salary.

In the FY1993 Defense Budget, the personnel and provisions expense category includes both salaries and provisions. The provisions cost was 1,940 trillion yen (see Appendix P). Since the ratio of personnel to provisions is about 98%, the cost of personnel salaries was 1,901 trillion yen. If this value is doubled, the personnel expense becomes 3,802 trillion yen. Adding this value to the provision expense yields 6,541 trillion yen as the total Defense Budget. Japan had a 495,300 trillion yen GNP in 1993.³⁰ Thus, the ratio of defense expenditures to GNP would be 1.3%. This is approximately 0.3% higher after doubling salaries.

Table 12 shows the ratio of defense expenditures to GNP for other countries. In comparison with these countries, Japan's defense burden with the higher salaries does not seem unreasonable.

³⁰ Defense of Japan 1994 (Defense Agency) p282.

	COUNTRY	DEFENSE EXPENDITURE (1985 \$) (million dollar)	DEFENSE EXPENDITURE /person (1985 \$) (dollar)	DE/GNP(GDP) (%)
1	UNITED STATES	242,717	964	5.3
2	RUSSIA	39,680	268	9.9
3	CHINA	22,364	19	5
4	FRANCE	21,898	385	3.4
5	UNITED KINGDOM	20,726	366	4
6	GERMANY	19,252	251	2.4
7	JAPAN	16,901	136	1
8	SAUDI ARABIA	14,535	1,371	11.8
9	ITALY	10,690	186	2
10	KUWAIT	10,185	5,000	62.4
11	CANADA	7,790	288	2
12	INDIA	7,550	9	2.5
13	SOUTH KOREA	7,189	160	3.8
14	TAIWAN	5,373	253	4.8
15	NORTH KOREA	5,087	214	25.7
16	AUSTRALIA	4,335	254	2.4
17	CROATIA	4,330	913	24.1
18	UKRAINE	4,320	82	3.8
19	U.A.E	4,249	2,418	14.6
20	ISRAEL	3,984	783	11.1

source: The Military Balance 1993-1994

Table 12. Defense Expenditures and Defense Burdens for High-Ranking Countries (1992)

F. AN ALTERNATIVE FLEET CONFIGURATION

1. Review of the Current Fleet Configuration

In accordance with the policy directive that NDPO adopted in October 1976, JMSDF has about 160 ships, including 62 destroyers, 16 submarines, 36 mine sweepers, and other service forces or auxiliary ships (see Figure 33). As shown in Figure 34, 59% of the total ship personnel is assigned to Destroyers. In addition, destroyers can be divided into four categories, based upon their missions (i.e., Anti-Submarine ships, Anti-Air

ships, Anti-Surface ships, and Multi-Purpose ships). Figure 35 shows the distribution of destroyers across missions.

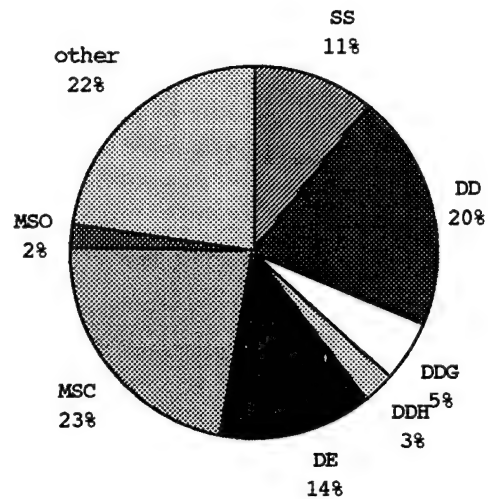


Figure 33. The Distribution of JMSDF Ships

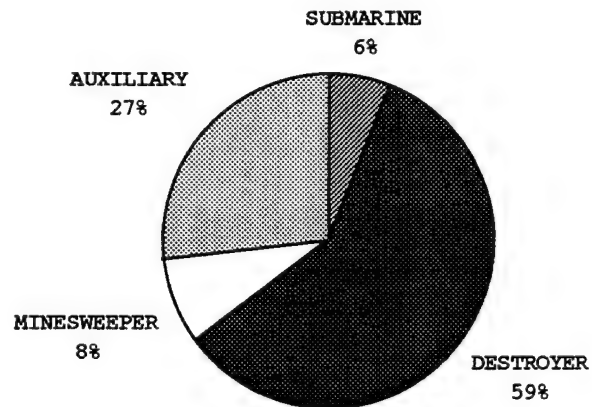


Figure 34. The Distribution of Ships' Crews

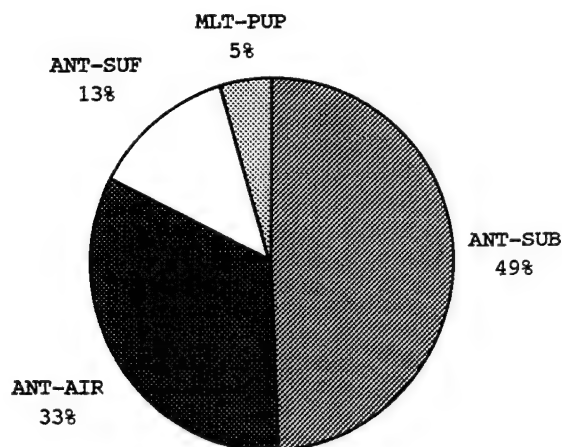


Figure 35.

The Distribution of JMSDF Destroyers Across Missions

Note that half of all JMSDF Destroyers are designed for anti-submarine warfare. Such predominance of anti-submarine warfare in JMSDF reflects the joint Japanese/U.S. strategy to counter Soviet submarine threats during the Cold War. However, the possibility of full-scale attack on the sea-lanes by Soviet submarines has declined. Consequently, the number of these ships could be reduced. In fact, many experts call for a more balanced Japanese defense capability.³¹ It is important to conduct a thorough review of Japanese defense capabilities. Such a review should cover a broad range of Japan's defense-related matters, including organization, formations and deployment of the SDF, human and fiscal constraints, and the latest technological trends. The following will consider a possible alternative fleet

³¹ The Modality of the Security and Defense Capability of Japan (Advisory Group on Defense Issues) p22.

configuration and examine its feasibility in terms of costs and manpower requirements.

2. Fleet Configurations in Other Countries

Before considering a new fleet configuration for JMSDF, it may help to examine the fleet configuration of other countries. Their assets are categorized into aircraft carriers (CV), ballistic missile submarines (SSBN), other submarines (SS), cruisers (CC), destroyers (DD), frigates (FF), mine warfare ships (M/W), amphibious warfare ships (A/W), and auxiliary ships. Figures 36 through 39 show fleet configurations for the U.S., Russia, France, the U.K., Russia Pacific, China, South Korea, North Korea and Japan. Configurations are expressed in numbers of ships and full ton displacement (in natural logarithmic scale) (see Appendix Q). Figure 38 visually illustrates how the U.S, Russia, U.K, and France have well-balanced fleet configurations. In contrast to these countries, JMSDF lacks the strategic capability and ability to defend any area beyond JASDF's fighter coverage range.

a. Comparison of Aircraft Assets Comparison Across Countries

Figure 40 compares the naval aircraft assets of the previously listed countries. They are categorized into bomber (BBR), fighter (FTR), anti-submarine warfare (ASW), maritime reconnaissance (MR), electric warfare (EW), airborne early warning (AEW), commando (CDO), and mine countermeasure (MCM) aircraft. Figure 40 again illustrates that the ASW mission capability dominates in the JMSDF; JMSDF lacks other mission capabilities.

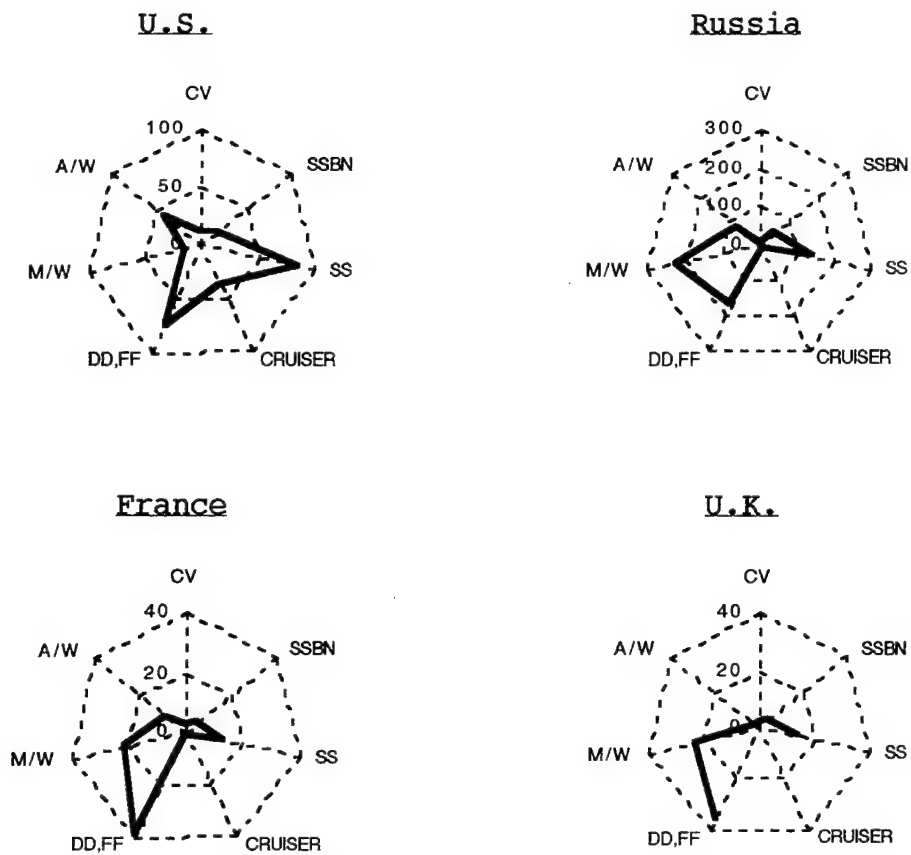


Figure 36. Fleet Composition by Total Ships: U.S., Russia, France and U.K. (Number of Ships)

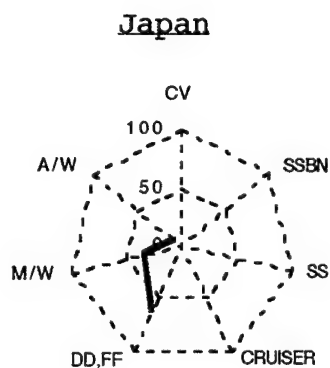
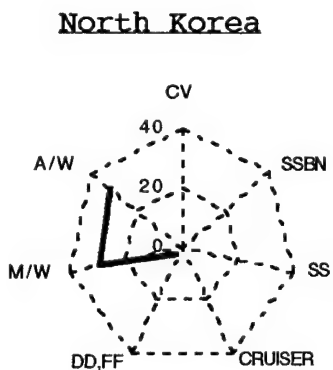
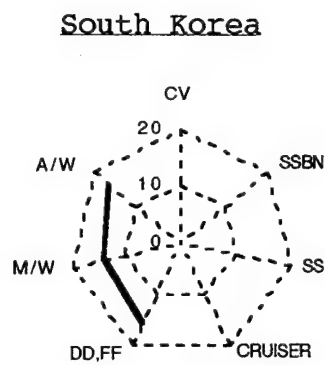
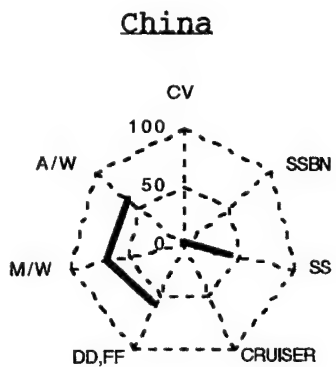
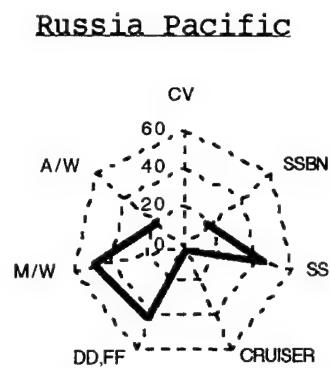
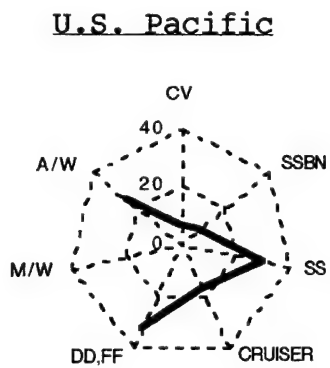


Figure 37. Fleet Composition by Total Ships: Asian-Pacific Theater (Number of Ships)

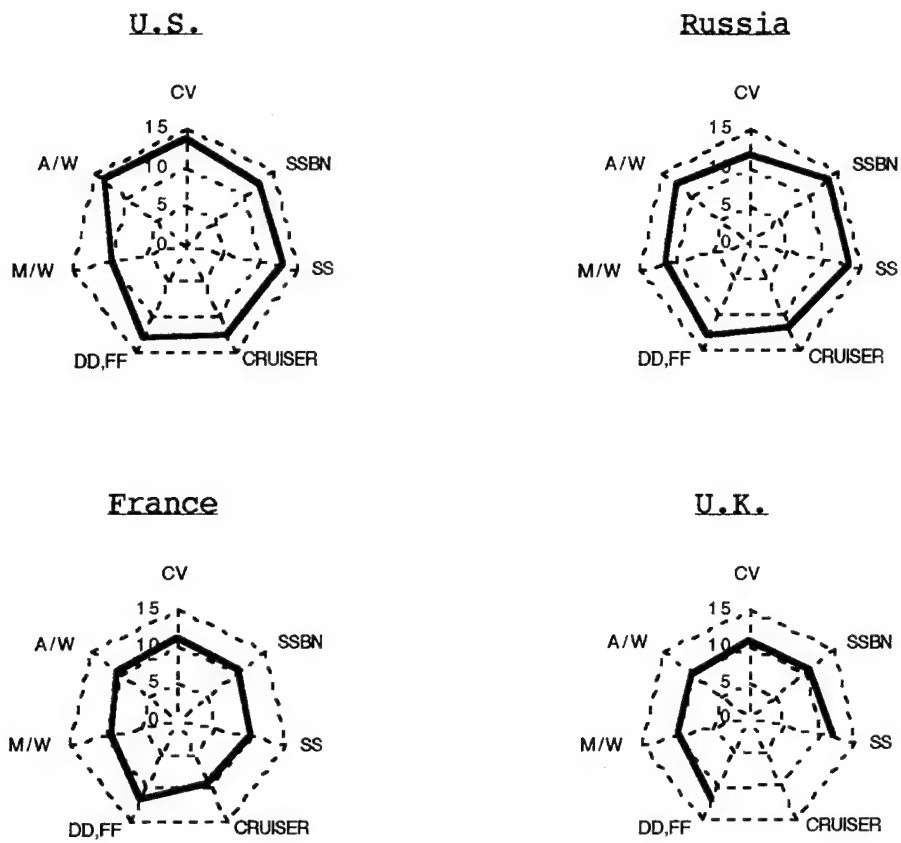
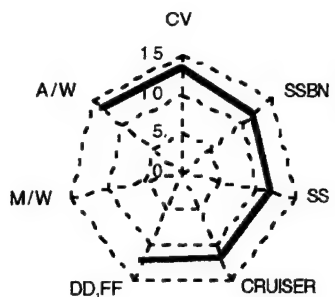
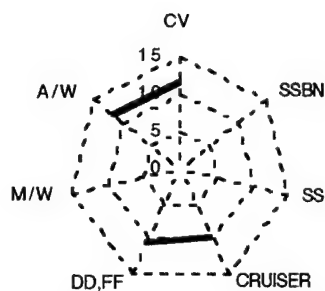


Figure 38. Fleet Composition by Displacement (Full Tons):
U.S., Russia, France and U.K. (In Natural Log)

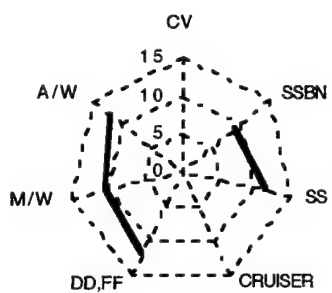
U.S. Pacific



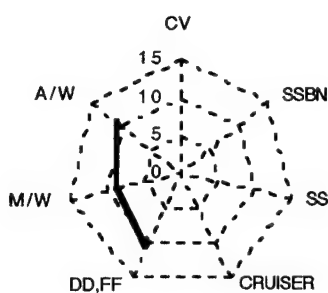
U.S. Pacific (in Japan)



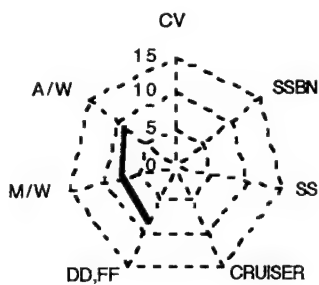
China



South Korea



North Korea



Japan

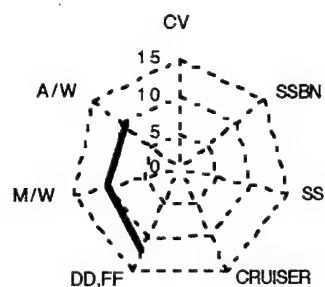


Figure 39. Fleet Composition by Displacement (Full Tons):
Asia-Pacific Theater (In Natural Log)

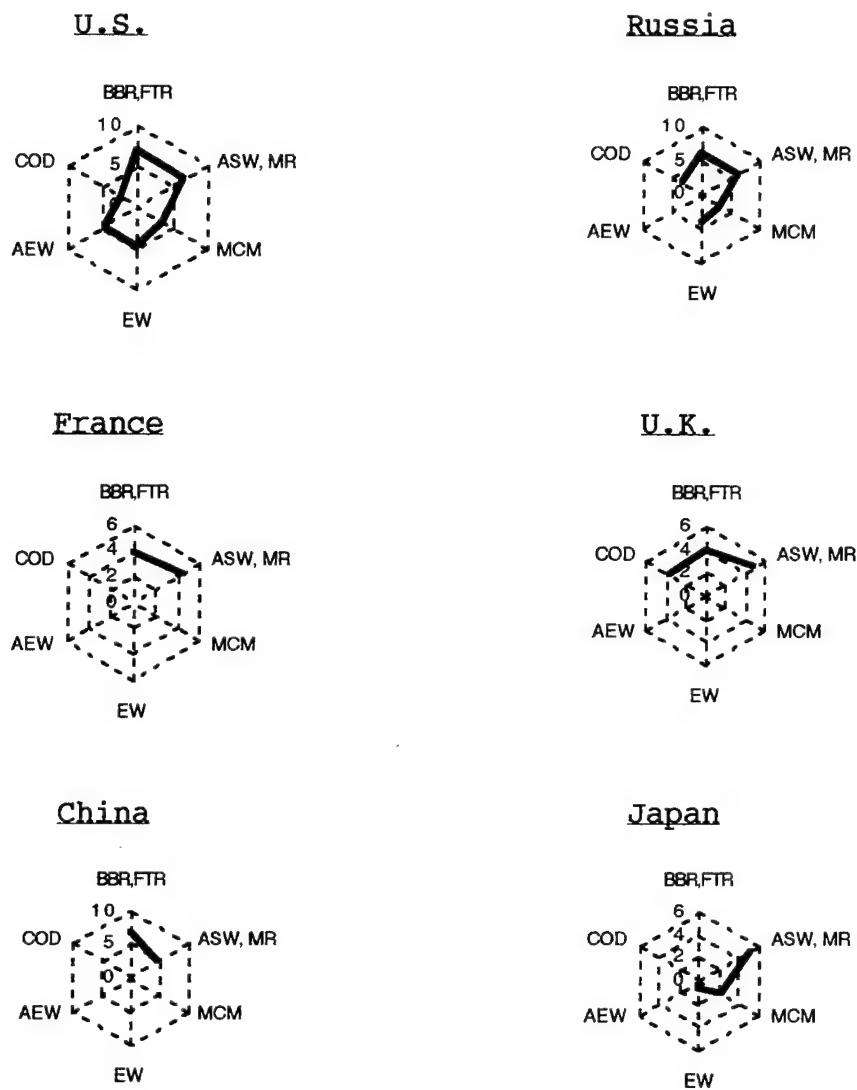


Figure 40. Aircraft Asset Comparison by Number of Aircraft:
Asia-Pacific Theater (Number of Aircraft in Natural Log.)

3. An Alternative JMSDF Fleet Configuration

An alternative JMSDF fleet configuration for the Post-Cold War period is summarized in Table 13. Table 14 provides a more detailed description of ship assets and personnel requirements

based on the new configuration. The personnel complement was calculated based on the ratio of crew/displacement ton calculated earlier. The number of DDV and DDH, DDG, DD is consistent with a basic escort flotilla (1 DDV, 1 DDH, 2 DDG, 8 DD and 2 AOE). Table 15 shows the associated aircraft configuration. Figure 41 contrasts the old and new fleet configurations in terms of displacement tons (expressed in natural logarithms). The new configuration provides an enhanced anti-aircraft capability.

<u>Basic Units</u> Multi-Purpose Surface-Ship Units (for mobile operation) Multi-purpose Surface-Ship Units (Regional District units) Submarine Units Mine sweeping Units Land-based Anti-submarine Aircraft Units	2 Escort Flotilla 10 Divisions 6 Divisions 2 Flotilla 16 Squadrons
<u>Main Equipment</u> Anti-submarine surface Ships Submarines Combat Aircraft	Approx. 45 Ships 16 Submarines Approx. 190 Aircraft

Table 13. Alternative Fleet Configuration

TYPE		NUMBER	STD. TRON	COMPLEMENT
SUBMARINE	SS	16	2,500	70
CARRIER	DDV	2	15,000	450
DESTROYER	DDH	2	5,000	200
	DDG	4	7,000	280
	DD	38	4,500	180
MINE	MST	4	4,000	240
SWEEPER	MSO	6	1,500	90
	MSC	45	550	30
AMPHIBIOUS	LST	2	9,000	360
	LST	6	3,500	210
AUXILIARY	AOE	4	10,000	200
	ASR	2	3,500	100
	ATSS	2	2,500	70
	ATS	2	3,000	90
	AOS	4	3,000	30
	AGS	4	3,000	120
	ARC	2	5,000	150
	ASE	2	3,000	90
	AGB	1	10,000	150
	TV	3	4,000	160

Table 14. Ship Configuration for New NDPO

TYPE		NUMBER	CREW
FTR	VFA	40	1
ASW	VP	80	10
	SH	48	3
EW	EP	6	10
MCM	MH	12	7
OTHERS			
TPT	VC	8	4
RESQ	US	7	10
RESQ	UH	21	3
MULTI	UP	4	5
TRG	-	80	2

Table 15. Aircraft Configuration for New NDPO

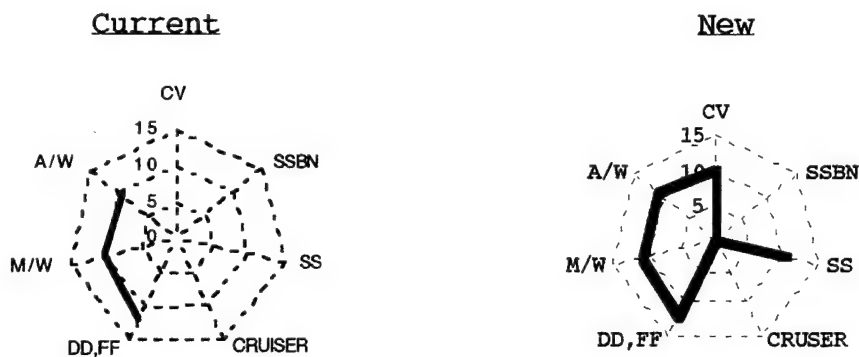


Figure 41. Current and New NDPO Fleet Configuration by Displacement, Full Tons (in Natural Log)

4. Manpower Requirement of New Fleet Configuration

a. Ship Crew Requirement

Table 16 estimates the total crew requirements by ship type and total number of ships. As discussed earlier, these estimates are based on current data and the historic manpower substitution rates.

TYPE		NUMBER	COMPLEMENT	Total Crew
SUBMARINE	SS	16	70	1,120
CARRIER	DDV	2	450	900
DESTROYER	DDH	2	200	400
	DDG	4	280	1,120
	DD	38	180	6,840
MINE SWEEPER	MST	4	240	960
	MSO	6	90	540
	MSC	45	30	1,350
AMPHIBIOUS	LST	2	360	720
	LST	6	210	1,260
AUXILIARY	AOE	4	200	800
	ASR	2	100	200
	ATSS	2	70	140
	ATS	2	90	180
	AOS	4	30	120
	AGS	4	120	480
	ARC	2	150	300
	ASE	2	90	180
	AGE	1	150	150
	TV	3	160	480
OTHERS				500
TOTAL		151	3,270	18,740

Table 16. Estimated Ship Crew Requirements

b. Flight Crew and Maintenance Personnel Requirement

Table 17 estimates the flight crew requirement. Table 18 shows the estimated requirement for aviation maintenance. Both estimates are based on the current personnel levels.

TYPE		NUMBER	CREW	COEFFI.	TOTAL
FTR	VFA	40	1	2.0	80
ASW	VP	80	10	1.5	1,200
	SH	48	3	2.0	288
EW	EP	6	10	1.5	90
MCM	MH	12	7	2.0	168
OTHERS					
TPT	VC	8	4	1.2	38
RESQ	US	7	10	1.5	105
RESQ	UH	21	3	2.0	126
MULTI	UP	4	5	1.5	30
TRG	-	80	2	1.5	240
TOTAL		306	55		2,365

Table 17. Estimated Flight Crew Requirement

TYPE		NUMBER	COEFFI.	TOTAL
FTR	VFA	40	15.0	600
ASW	VP	80	20.0	1,600
	SH	48	14.0	672
EW	EP	6	20.0	120
MCM	MH	12	14.0	168
OTHERS				
TPT	VC	8	20.0	160
RESQ	US	7	20.0	140
RESQ	UH	21	14.0	294
MULTI	UP	4	20.0	80
TRG	-	80	5.0	400
TOTAL		306	162	4,234

Table 18. Estimated Aviation Maintenance Personnel Requirement

c. Total Estimated Manpower Requirement for New Fleet Configuration

Table 19 shows the total estimated manpower for the new fleet configuration. "ON SHORE", "COMMON", and "RESERVE" personnel requirements are based on current staffing levels.

TYPE	MANPOWER
SHIP'S CREW	18,740
AVIATION	6,599
ON SHORE	11,000
COMMON	2,000
RESERVE	2,000
TOTAL	40,339

Table 19. Total Estimated Man Power
Requirement for New Fleet Configuration

The alternative fleet configuration requires 40,339 personnel, which is a 12.5% reduction from the current manpower level (the FY1994 JMSDF personnel level is 46,085). This suggests that the alternative fleet configuration has a more viable manpower requirement than the existing configuration. However, this reduction alone may not be sufficient to solve the future staffing problem.

5. Comparative Cost Estimate of the Current and New Fleet Configurations

This section compares the costs for the current and new alternative NDPO configurations. Total costs are estimated for each configuration during the period from FY 2005 to FY 2015.

a. Cost Estimate of Ship Assets

Table 20 estimates the ship asset cost for the current NDPO configuration from FY2005 to FY2015. Table 21 estimates the ship asset cost for the new NDPO configuration. Calculations for these tables are provided in Appendices R and S. Comparing Tables 20 and 21 shows that the new NDPO configuration reduces ship asset costs by 1.172 trillion yen, or 31.8%.

(unit:Constant 1,000Yen in 1985 year Yen)

TYPE	NDPO level status	Decommission during term	Shipbuilding requirement	Estimated Price	Total
SS	16	11	11	73,778,657	811,565,227
DDH	4	3	3	111,677,445	335,032,335
DDG	8	3	3	234,534,151	703,602,453
DD	30	9	9	108,149,242	973,343,178
DD(DE)	20	7	7	81,054,702	567,382,914
MST	4	0	0	-	-
MSO	3	3	3	46,735,466	140,206,398
MSC	33	18	18	9,805,065	176,491,170
LST	1	0	0	-	-
LST	6	4	4	19,040,702	76,162,808
AOE	4	1	1	30,217,951	30,217,951
ASR	2	1	1	3,343,452	3,343,452
ATS	2	0	0	-	-
AOS	2	0	0	-	-
AGS	4	2	2	17,461,435	34,922,870
ARC	1	1	1	43,585,981	43,585,981
ASE	2	1	1	51,693,799	51,693,799
AGB	1	1	1	-	-
TV	3	0	0	-	-
TOTAL	146	65	65	831,078,048	3,947,550,536

NOTE: AGB is built by the budget of Education Department.

Table 20. Estimated Cost of Ship Assets: Current NDPO Configuration

(Unit: Constant 1,000 Yen in 1985 year Yen)

TYPE	New NDPO level	NDPO level	Decommission during term	Shipbuilding Requirement	Estimated Price	Total
SS	16	16	11	11	73,778,657	811,565,227
DDV	2	0	0	2	242,469,243	484,938,486
DDH	2	4	3	1	111,677,445	111,677,445
DDG	4	8	3	-1	234,534,151	-
DD	38	50	16	4	108,149,242	432,596,968
MST	4	4	0	0	-	-
MSO	6	3	3	6	46,735,466	280,412,796
MSC	45	33	18	30	9,805,065	294,151,950
LST	6	1	0	5	45,492,825	227,464,125
LST	4	6	4	2	19,040,702	38,081,404
AOE	2	4	1	-1	-	-
ASR	2	2	1	1	3,343,452	3,343,452
ATS	2	2	0	0	-	-
AOS	4	2	0	2	-	-
AGS	4	4	2	2	17,461,435	34,922,870
ARC	2	1	1	2	43,585,981	87,171,962
ASE	2	2	1	1	51,693,799	51,693,799
AGB	1	1	1	1	-	-
TV	3	3	0	0	-	-
TOTAL	149	146	65	68	1,007,767,463	2,858,020,484

NOTE: AGB is built by the budget of Education Department

Table 21. Estimated Cost of Ship Assets: New NDPO Configuration

b. Cost Estimate of Aircraft Assets

Table 22 estimates the cost of aircraft assets for the current NDPO level from FY2005 to FY2015. Table 23 estimates the cost of aircraft assets for the new NDPO configuration from FY2005 to FY2015. The calculations in these tables are provided Appendices T and U. Comparing Tables 22 and 23, the new NDPO configuration increases estimated aircraft costs by 32 billion yen, or 1.1%.

(unit:Constant 1,000 Yen in 1985 year Yen)

TYPE	NDPO level	Decommission during term	Aircraft Requirement	Estimated proce	Total
VP	80	80	80	24,939,277	1,995,142,160
SH	100	64	64	10,362,632	663,208,448
EP	5	2	2	25,828,731	51,657,462
MH	11	11	11	13,415,135	147,566,485
VC	4	0	0	-	-
US	7	7	7	15,474,666	108,322,662
UH	21	12	12	7,884,388	94,612,656
UP	2	1	1	30,528,119	30,528,119
TRG. etc	80	55	55		684,189,16
TOTAL	310	232	232	128,432,948	3,091,037,992

Table 22. Estimated Cost of Aircraft Assets: Current NDPO Configuration

(unit:Constant 1,000 Yen in 1985 year Yen)

TYPE	New NDPO level	NDPO level	Decommission during term	Aircraft Requirement	Estimated proce	Total
VFA	40	0	0	40	10,070,249	402,809,960
VP	80	80	80	80	24,939,277	1,995,142,160
SH	48	100	64	12	10,362,632	124,351,584
EP	6	5	2	3	25,828,731	77,486,193
MH	12	11	11	12	13,415,135	160,981,620
VC	8	4	0	4	-	-
US	7	7	7	7	15,474,666	108,322,662
UH	21	21	12	12	7,884,388	94,612,656
UP	4	2	1	3	30,528,119	91,584,357
TRG. etc	80	80	55	55		68,418,916
TOTAL	306	310	232	228	138,503,197	3,123,710,108

Table 23. Estimated Cost of Aircraft Assets: New NDPO Configuration

6. Cost Comparison Expressed in JMSDF Budgetary Format

a. Personnel and Provisions Category

Table 24 estimates the cost of Personnel and Provisions for the current NDPO configuration from FY2005 to FY2015. Table 25 shows the same results for the new NDPO configuration. These calculations use the estimated number of JMSDF personnel for FY2010, calculated as described earlier.

(Unit: Constant 1,000 Yen in 1985 year Yen)

1993 Budget (real)	Budget/Person		Number of Personnel in 2010	Expense in 2010	Expense 2005 - 2015
	1993	2010			
329,059,411	7,791	13,091	46,085	638,092,910	6,380,929,100

Note: Escalation Rate is 0.031, average from 1985 to 1993

Table 24. Estimated Personnel & Provisions Cost: Current NDPO Configuration

(Unit: Constant 1,000 Yen in 1985 year Yen)

1993 Budget (real)	Budget/Person		Number of Personnel in 2010	Expense in 2010	Expense 2005 - 2015
	1993	2010			
329,059,411	7,791	13,091	40,339	528,077,561	5,280,775,615

Note: Escalation Rate is 0.031, average from 1985 to 1993

Table 25. Estimated Personnel & Provisions Cost: New NDPO Configuration

b. Front-Line Costs

Front-line costs in the JMSDF budget include three costs: ship assets, aircraft assets, and ammunition. Each cost for the current NDPO configuration is estimated as follows:

- Ship Assets: 3,684,784,233 (1,000 Yen) -Table 20
- Aircraft Assets: 3,065,019,522 (1,000 Yen) -Table 22
- Ammunition: see Table 26 below

(Unit: Constant 1,000 Yen in 1985 year Yen)

1993 Budget (real)	Expense in 2010	Expense 2005 2015
41,097,536	183,485,030	1,834,850,298

Note: Escalation Rate is 0.092, average from 1985 to 1993

Table 26. Ammunition Expenses for
the Current Configuration

Ammunition costs are assumed to escalate 9.2% annually from their current level. Ammunition costs are assumed to be the same for both the current and new NDPO configurations.

Each cost item for the new NDPO configuration is estimated as follows:

- Ship Assets: 2,512,110,752 (1,000 Yen) -Table 21
- Aircraft Assets: 3,097,381,270 (1,000 Yen) -Table 23
- Ammunition: 1,834,850,298 (1,000 Yen) -Table 26

c. Others Costs

These costs were calculated according to the methodology used to estimate ammunition costs, except the escalation rate is 7.1% annually. These costs are the same for both configurations (see Table 27).

(Unit: Constant 1,000 Yen in 1985 year Yen)

1993 Budget (real)	Expense in 2010	Expense 2005 - 2015
331,655,062	1,064,406,785	10,644,067,853

Note: Escalation Rate is 0.071, average from 1985 to 1993

Table 27. Other Expense (2005-2015)

7. Comparison Costs for the Current and New NDPO Configurations

Table 28 compares the cost of the current and the new NDPO fleet configurations in the JMSDF annualized budgetary format. The new NDPO fleet configuration saves 687 billion yen annually; a 2.8% cost reduction.

(Unit: Constant 1,000 Yen in 1985 year Yen)

Ctegrory	NDPO level	New NDPO level
ship Assets	3,947,550,536	2,858,020,484
Aircraft assets	3,091,037,992	3,123,710,108
Personnel & Provisions	6,380,929,100	5,280,775,615
Ammunitions	183,485,030	1,834,850,298
Others	10,644,067,853	10,644,067,853
Total	24,247,070,511	23,741,424,358

Table 28. Comparison of Current NDPO with an Alternative Fleet Configuration

V. CONCLUSION

Japan may be at an important turning point similar to what the country experienced fifty years ago.

Since the World War II, Japan has been reconstructing its economic infrastructure under a military umbrella provided by the United States. Japan succeeded in developing into a major economic power without serious public discussion about defense policy. This domestic condition is represented in the phrase "Water and safety are FREE," which became popular in Japan during this period. However, this course of action was supported only during the Cold War when the U.S. and Japan were confronted by common threat, communism.

When the Cold War ended in 1989, the U.S. and Soviet Union began reducing their military power in the Asia-Pacific region. With the end of Cold War, however, China's powerful presence has been increasingly felt by her Asian neighbors. The Spratly Islands episode provided a glimpse of what the future might hold for China's neighbors. It left an indelible mark on the future direction of Asian-Pacific security.

In Japan, members of the Advisory Group on Defense Issues agree that Japan's place in the world is changing. They state that isolationism and defense spending cuts in are not in line with the global political reality.

This background motivated the primary research question, "What changes should JMSDF make to meet the challenges of the post-Cold War era?"

To answer this question, the thesis reviewed Japan's defense capability, and those of other Asia-Pacific countries. Although annual Japanese defense expenditures are now ranked 7th in the world, the Japanese defense force is not well-structured for the post-Cold War environment. A hypothetical alternative fleet configuration was constructed to determine its feasibility

in terms of costs and manpower requirements. The alternative configuration is found to be both cheaper and require less manpower.

However, adopting an alternative configuration requires a significant change in attitude toward national security amongst the Japanese population. Only frank and in-depth discussions concerning basic defense policy among the Japanese people and politicians determine the shape of the new fleet configuration. Furthermore, such discussions should be couched in a larger international context involving a firm understanding of the Japan-U.S. relationship.

APPENDICES

APPENDIX A.
BASIC POLICY FOR JAPAN'S NATIONAL DEFENSE

The objective of national defense is to prevent direct and indirect aggression, but once invaded, to repel such action, thereby preserving the independence and peace of Japan founded upon democratic principles.

To achieve this objective, the government of Japan hereby establishes the following principles:

1. To support the actives of the United Nations and promote international cooperation, thereby contributing to the realization of world peace.

2. To promote public welfare and enhance the people's love for the country, thereby establishing the sound basis essential to Japan's security.

3. To develop progressively the effective defense capabilities necessary for self-defense, with regard to the nation's resources and the prevailing domestic situation.

4. To deal with external aggression on the basis of the Japan-U.S. security arrangements, pending the effective functioning of the United States in the future in deterring and repelling such aggression.

source : Defense of Japan (defense Agency, Japan)

APPENDIX B.
TREND OF NAVAL FORCES (FULL TON) (U.S. PACIFIC)

	1985	1986	1987	1988	1989	1990	1991
SSBN	112,500	150,000	150,000	150,000	150,000	150,000	150,000
SSB							
SSGN							
SSG							
SSN	195,237	211,084	202,164	206,731	209,358	205,058	175,018
SS	8,176	8,176	8,176	8,176	8,176		
CARRIER		491,237	582,724	582,244	582,244	582,224	593,274
BATTLE SHIP	57,353	57,353	57,353	114,706	114,706	114,706	57,353
CRUSER	167,427	168,425	197,195	197,195	233,176	224,855	234,321
DESTROYER	197,648	197,648	197,648	197,648	197,648	187,998	173,523
FRIGATE	159,325	156,309	160,186	152,671	129,998	122,084	111,680
MINE WAREFARE FORCE						2,624	3,936
AMPHIBIOUS FORCE	512,620	516,196	516,196	531,922	531,922	535,498	542,774
TOTAL	1,410,286	1,956,428	2,071,642	2,141,293	2,157,228	2,125,047	2,041,879

	1992	1993	1994
SSBN	150,000	150,000	150,000
SSB			
SSGN			
SSG			
SSN	168,385	183,562	183,562
SS			
CARRIER	609,156	528,513	533,412
BATTLE SHIP			
CRUSER	253,194	262,660	162,335
DESTROYER	144,573	139,748	165,014
FRIGATE	99,666	52,376	52,376
MINE WAREFARE FORCE	3,936	2,092	
AMPHIBIOUS FORCE	560,191	521,191	474,235
TOTAL	1,989,101	1,840,142	1,720,934

Note : 1. MINE WAREFARE FORCE count LSMs and above.
: 2. Amphibious Force count LSMs and above.

Source : JANE'S FIGHTING SHIP 1985-1986 ~ 1994-1995

APPENDIX C.
TREND OF NAVAL FORCES (FULL TON) (RUSSIA)

	1985	1986	1987	1988	1989	1990	1991
SSBN	820,600	850,700	825,050	740,850	734,550	766,250	740,600
SSB	44,250	44,250	44,250	41,300	35,400		
SSGN	302,150	314,650	327,150	322,150	337,650	345,350	301,550
SSG	64,600	61,600	61,600	61,600	61,600	61,600	57,750
SSN	390,200	408,500	399,300	479,200	504,900	487,400	403,900
SS	330,430	339,010	318,861	292,411	286,287	281,790	249,892
CARRIER	162,000	162,000	162,000	162,000	162,000	229,500	229,500
BATTLE SHIP							
CRUSER	502,000	502,000	513,200	524,400	514,300	393,900	329,050
DESTROYER	324,520	336,330	333,380	312,780	313,770	307,270	266,250
FRIGATE	329,170	332,150	324,270	323,340	321,310	310,570	299,120
MINE WAREFARE FORCE	130,175	132,725	132,725	130,675	128,495	122,739	115,279
AMPHIBIOUS FORCE	201,292	217,612	221,692	222,652	226,732	239,332	241,790
TOTAL	3,601,387	3,701,527	3,663,478	3,613,358	3,626,994	3,545,701	3,234,681

	1992	1993	1994
SSBN	731,150	683,150	624,200
SSB			
SSGN	287,650	251,600	215,000
SSG	46,200	26,950	19,250
SSN	433,400	436,300	374,500
SS	225,844	207,246	198,548
CARRIER	229,500	189,000	112,000
BATTLE SHIP			
CRUSER	313,650	267,050	186,750
DESTROYER	266,450	259,500	243,774
FRIGATE	289,620	278,120	263,900
MINE WAREFARE FORCE	102,137	99,247	92,879
AMPHIBIOUS FORCE	240,954	235,634	233,234
TOTAL	3,166,555	2,933,797	2,564,035

Note : 1. MINE WAREFARE FORCE count LSMs and above.
: 2. Amphibious Force count LSMs and above.

Source : JANE'S FIGHTING SHIP 1985-1986 - 1994-1995

APPENDIX D.
TREND OF NAVAL FORCES(FULL TON) (CHINA)

	1985	1986	1987	1988	1989	1990	1991
SSBN	16,000	16,000	32,000	8,000	8,000	8,000	8,000
SSB	2,950	2,950	2,950	2,950	2,950		
SSGN							
SSG	1,700	1,700	2,100	2,100	2,100	2,100	2,100
SSN	15,000	15,000	15,000	10,000	10,000	20,000	20,000
SS	183,686	193,119	180,309	86,696	88,809	95,148	97,261
CARRIER							
BATTLE SHIP							
CRUSER							
DESTROYER	63,210	61,170	61,170	62,800	59,540	63,210	55,050
FRIGATE	52,268	54,088	62,412	60,488	57,728	70,780	68,184
MINE WAREFARE FORCE	14,160	16,520	56,840	54,480	58,730	62,600	62,600
AMPHIBIOUS FORCE	115,708	130,478	137,968	153,808	149,658	157,658	160,438
TOTAL	464,682	491,025	550,749	441,322	437,515	479,496	473,633

	1992	1993	1994
SSBN	8,000	8,000	8,000
SSB			
SSGN			
SSG	2,100	2,100	2,100
SSN	25,000	25,000	25,000
SS	92,054	76,747	71,804
CARRIER			
BATTLE SHIP			
CRUSER			
DESTROYER	62,390	58,720	66,590
FRIGATE	70,760	70,180	68,426
MINE WAREFARE FORCE	63,220	30,043	30,353
AMPHIBIOUS FORCE	152,278	126,000	135,080
TOTAL	475,802	396,790	407,353

Note : 1. MINE WAREFARE FORCE count LSMs and above.
: 2. Amphibious Force count LSMs and above.

Source : JANE'S FIGHTING SHIP 1985-1986 ~ 1994-1995

APPENDIX E.
TREND OF MILITARY FORCES IN ASIAN-PACIFIC AREA

Country	Force	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
U.S.	Seventh Fleet										
	Total Number	70	70	70	70	70	70	60	60	60	60
	Total Ton(million)	70	70	70	70	70	70	65	65	65	65
	Air Craft	230	230	230	230	230	200	130	140	140	140
	In Korea										
	Divisions	1	1	1	1	1	1	1	1	1	1
	Total Number(million)	3	3.2	3.1	3.2	3.2	3.2	3.2	3	2.6	2.6
	Air Craft	100	100	100	100	100	110	90	90	80	80
	In Japan										
	Divisions	1	1	1	1	1	1	1	1	1	1
	Total Number(million)	2.3	2.4	2.5	2.6	2.7	2.6	2.1	2.3	2.4	2.6
	Air Craft	170	190	190	220	220	220	220	220	190	200
Russia (Far East)	Ground Force										
	Divisions	41	41	43	43	43	41	38	36	33	27
	Total Number(million)	37	27	39	39	39	36	34	32	29	24
	Naval Vessels										
	Total Number	835	840	840	845	840	830	820	780	760	745
	Total Ton(million)	178	185	185	190	190	194	212	207	192	189
	Air Force										
	Combat Aircraft	2,200	2,390	2,390	2,430	2,430	2,240	2,060	1,860	1,430	1,220
China	Ground Force										
	Divisions	135	135	120	120	120	120	120	120	120	100
	Total Number(million)	316	297	211	230	230	230	230	230	230	230
	Naval Vessels										
	Total Number	1740	1730	1870	2000	1980	2060	2010	1910	1060	1080
	Total Ton(million)	91.4	87.7	98.3	94.6	94.5	100	98	98	91	95
	Air Force										
	Combat Aircraft	6,010	6,100	6,200	6,200	6,000	6,050	6,080		6,170	6,160
South Korea	Ground Force										
	Divisions	22	21	21	21	21	21	21	21	22	22
	Total Number(million)	54	52	52	54.2	54.2	55	55	55	55	55
	Naval Vessels										
	Total Number	140	150	160	160	170	180	180	180	220	230
	Total Ton(million)	9.9	9	11	10.4	11.3	11.4	11.6	11	12.8	14
	Marine (million)	2	2.2	2.3	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	Air Force										
	Combat Aircraft	440	350	360	380	390	380	470	420	470	490
North Korea	Ground Force										
	Divisions	39	33	33	32	26	31	25	25	30	26
	Total Number(million)	70	75	75	75	75	93	93	93	100	113
	Naval Vessels										
	Total Number	500	510	520	510	520	590	590	620	620	620
	Total Ton(million)	6.8	7	7.2	6.6	7.1	7.4	7.3	8.1	8.8	8.5
	Air Force										
	Combat Aircraft	740	700	750	740	770	770	790	800	810	810

Note : 1 Data available from "Military Balance" etc.

2 Combat aircraft include navy and marine corps aircraft.

Source : Defense of Japan 1985-1994 (Japan Defense Agency)

APPENDIX F.
TREND OF NAVAL FORCES (FULL TON) (SOUTH KOREA)

	1985	1986	1987	1988	1989	1990	1991	1992
SSBN								
SSB								
SSGN								
SSG								
SSN								
SS								
NIDGET SS	175	175	175	525	525	525	1,050	1,225
CARRIER								
BATTLE SHIP								
CRUSER								
DESTROYER	37,030	37,030	37,030	30,930	30,930	30,930	30,930	30,900
FRIGATE	12,880	12,880	19,420	12,980	15,260	15,260	15,260	15,260
MINE WAREFARE FORCE				3,480	3,480	4,520	5,040	3,480
AMPHIBIOUS FORCE				40,305	40,305	40,305	36,225	36,225
TOTAL	50,085	50,085	56,625	88,220	90,500	91,540	88,505	87,090
COLVETTES			14,820	13,680	28,740	30,640	30,640	30,640

Note : 1. MINE WAREFARE FORCE count LSMs and above.
: 2. Amphibious Force count LSMs and above.

Source : JANE'S FIGHTING SHIP 1985-1986 - 1994-1995

	1993	1994
SSBN		
SSB		
SSGN		
SSG		
SSN		
SS	1,285	2,570
NIDGET SS	700	1,189
CARRIER		
BATTLE SHIP		
CRUSER		
DESTROYER	30,390	27,610
FRIGATE	20,100	20,100
MINE WAREFARE FORCE	4,520	6,130
AMPHIBIOUS FORCE	37,320	41,250
TOTAL	94,315	98,849
COLVETTES	30,640	32,364

APPENDIX G.
TREND OF NAVAL FORCES (FULL TON) (NORTH KOREA)

	1985	1986	1987	1988	1989	1990	1991
SSBN							
SSB							
SSGN							
SSG							
SSN							
SS	32,850	32,850	32,850	34,680	36,510	38,340	38,340
MIDGET SS						3,600	4,230
CARRIER							
BATTLE SHIP							
CRUSER							
DESTROYER							
FRIGATE	3,000	6,000	3,000	3,000	4,845	4,845	4,845
MINE WAREFARE FORCE				1,500	1,740	1,740	1,740
AMPHIBIOUS FORCE							
AMPHIBIOUS FORCE	580	870	1,160	870	870	4,495	4,495
TOTAL	36,430	39,720	37,010	40,050	43,965	53,020	53,650

	1992	1993	1994
SSBN			
SSB			
SSGN			
SSG			
SSN			
SS	42,000	45,750	38,430
MIDGET SS	4,320	4,320	5,400
CARRIER			
BATTLE SHIP			
CRUSER			
DESTROYER			
FRIGATE	4,845	4,845	4,845
MINE WAREFARE FORCE	1,740	1,740	1,740
AMPHIBIOUS FORCE			
AMPHIBIOUS FORCE	4,495	4,495	4,495
TOTAL	57,400	61,150	54,910

Note : 1. MINE WAREFARE FORCE count LSMs and above.
: 2. Amphibious Force count LSMs and above.

Source : JANE'S FIGHTING SHIP 1985-1986 - 1994-1995

APPENDIX H. **CHANGE IN DEFENSE EXPENDITURES**

(Unit:100 million YEN, %)

FY	1958	1959	1960	1961	1962	1963	1964	1965
Defence (DE)	1,485	1,560	1,569	1,803	2,085	2,412	2,751	3,014
GNP	102,470	107,620	127,480	156,200	176,700	203,900	240,700	281,600
BUDGET	13,121	14,192	15,697	19,528	24,268	28,500	32,554	36,581
Ratio(%)								
(1)DE/GNP	1.45%	1.45%	1.23%	1.15%	1.18%	1.18%	1.14%	1.07%
(2)DE/BUGET	11.32%	10.99%	10.00%	9.23%	8.59%	8.46%	8.45%	8.24%

FY	1966	1967	1968	1969	1970	1971	1972	1973
Defence (DE)	3,407	3,809	4,221	4,838	5,695	6,709	8,002	9,355
GNP	308,500	409,500	478,400	578,600	724,400	843,200	905,500	1,098,000
BUDGET	43,143	49,509	58,185	67,395	79,497	94,143	114,677	142,841
Ratio(%)								
(1)DE/GNP	1.10%	0.93%	0.88%	0.84%	0.79%	0.80%	0.88%	0.85%
(2)DE/BUGET	7.90%	7.69%	7.25%	7.18%	7.16%	7.13%	6.98%	6.55%

FY	1974	1975	1976	1977	1978	1979	1980	1981
Defence (DE)	10,930	13,273	15,124	16,906	19,010	20,945	22,302	24,000
GNP	1,315,000	1,585,000	1,681,000	1,928,500	2,106,000	2,320,000	2,478,000	2,648,000
BUDGET	170,994	212,888	242,960	285,143	342,950	386,001	425,888	467,881
Ratio(%)								
(1)DE/GNP	0.83%	0.84%	0.90%	0.88%	0.90%	0.90%	0.90%	0.91%
(2)DE/BUGET	6.39%	6.23%	6.22%	5.93%	5.54%	5.43%	5.24%	5.13%

FY	1982	1983	1984	1985	1986	1987	1988	1989
Defence (DE)	25,861	27,542	29,346	31,371	33,435	35,174	37,003	39,198
GNP	2,772,000	2,817,000	2,960,000	3,146,000	3,367,000	3,504,000	3,652,000	3,897,000
BUDGET	496,808	503,796	506,272	524,996	540,886	541,010	566,997	604,142
Ratio(%)								
(1)DE/GNP	0.93%	0.98%	0.99%	0.997%	0.993%	1.004%	1.013%	1.006%
(2)DE/BUGET	5.21%	5.47%	5.80%	5.98%	6.18%	6.50%	6.53%	6.49%

FY	1990	1991	1992	1993	1994
Defence (DE)	41,593	43,860	45,518	46,406	46,835
GNP	4,172,000	4,596,000	4,837,000	4,953,000	4,940,000
BUDGET	662,368	703,474	722,180	723,548	730,817
Ratio(%)					
(1)DE/GNP	0.997%	0.954%	0.941%	0.937%	0.948%
(2)DE/BUGET	6.28%	6.23%	6.30%	6.41%	6.41%

Source: BOUEI HANDBOOK (Asagumo Shinbunsha)

note: 1. BUDGET is shown by Original Budget.

2. GNP is Shown by Initial forecasted GNP.

3. Defense Expenditure and Budget of FY1994 are Government Plan

APPENDIX I.
CHANGE IN JAPAN'S MAJOR GENERAL ACCOUNT EXPENDITURE (ORIGINAL BUDGET)

Fiscal Year	1973	1974	1975	1976	1977	1978	1979
Social Welfare	21,154	28,919	39,282	48,076	56,919	67,811	76,266
Education & Science	15,708	19,633	26,401	30,292	34,301	38,516	42,997
Defense	9,355	10,930	13,273	15,124	16,906	19,010	20,945
public Works	28,408	28,407	29,095	35,272	42,810	54,501	65,401
Others	68,221	83,105	104,837	114,196	134,207	163,112	180,392
Total	142,846	170,994	212,888	242,960	285,143	342,950	386,001

Fiscal Year	1980	1981	1982	1983	1984	1985	1986
Social Welfare	82,124	88,369	90,848	91,398	93,210	95,736	98,346
Education & Science	45,250	47,420	48,637	48,186	48,665	48,409	48,445
Defense	22,302	24,000	25,861	27,542	29,346	31,371	33,435
public Works	66,554	66,554	66,554	66,554	65,200	63,689	62,233
Others	209,659	241,537	264,906	270,116	269,849	285,792	298,426
Total	425,889	467,880	496,806	503,796	506,270	524,997	540,885

Fiscal Year	1987	1988	1989	1990	1991	1992	1993
Social Welfare	100,896	103,845	108,947	116,148	122,132	127,378	131,457
Education & Science	48,497	48,581	49,371	51,129	53,944	56,834	58,205
Defense	35,174	37,003	39,198	41,593	43,860	45,518	46,406
public Works	60,824	60,824	61,974	62,147	65,897	69,409	73,354
Others	295,618	316,744	344,653	391,350	417,641	423,041	414,126
Total	541,009	566,997	604,143	662,367	703,474	722,180	723,548

Fiscal Year	1994
Social Welfare	134,816
Education & Science	59,578
Defense	46,835
public Works	77,546
Others	412,042
Total	730,817

Source : Kaijougijietai Yosan Jomuteiyou (kaijoubakuryoukanbu)

APPENDIX J.
TREND IN JAPAN'S DEFENSE EXPENDITURES (BY ORGANIZATION)

FISCAL YEAR	1974	1975	1976	1977
JGSDF BUDGET	436,063,610	556,630,000	651,653,279	714,429,431
JMSDF BUDGET	238,992,567	268,047,521	314,051,000	357,156,190
JASDF BUDGET	279,999,635	335,587,135	362,179,754	413,594,535
OTHS BUDGET	137,968,083	167,057,216	184,466,563	205,433,169
TOTAL	1,093,023,895	1,327,321,872	1,512,350,596	1,690,613,325

FISCAL YEAR	1978	1979	1980	1981
JGSDF BUDGET	799,065,903	859,871,056	887,274,653	944,307,702
JMSDF BUDGET	421,108,858	454,003,847	509,657,110	553,162,912
JASDF BUDGET	437,841,542	482,653,097	514,435,291	564,635,120
OTHS BUDGET	243,013,290	297,961,291	318,835,424	337,913,175
TOTAL	1,901,029,593	2,094,489,291	2,230,202,478	2,400,018,909

FISCAL YEAR	1982	1983	1984	1985
JGSDF BUDGET	986,020,584	1,027,337,475	1,077,538,962	1,161,200,110
JMSDF BUDGET	602,902,259	654,037,117	705,983,574	733,266,575
JASDF BUDGET	633,668,319	699,426,640	758,720,730	827,518,662
OTHS BUDGET	363,544,309	373,433,151	392,401,518	415,162,801
TOTAL	2,586,135,471	2,754,234,383	2,934,644,784	3,137,148,148

FISCAL YEAR	1986	1987	1988	1989
JGSDF BUDGET	1,249,516,952	1,286,199,804	1,330,266,311	1,379,272,640
JMSDF BUDGET	793,286,424	861,548,204	940,748,823	971,559,836
JASDF BUDGET	870,559,587	898,284,910	934,169,264	1,030,049,496
OTHS BUDGET	430,186,107	471,400,863	495,143,542	537,952,323
TOTAL	3,343,549,070	3,517,433,781	3,700,327,940	3,918,834,295

FISCAL YEAR	1990	1991	1992	1993
JGSDF BUDGET	1,474,852,513	1,563,154,276	1,633,400,000	1,667,540,000
JMSDF BUDGET	976,022,583	1,085,383,204	1,100,200,000	1,084,906,000
JASDF BUDGET	1,121,705,999	1,118,218,270	1,153,200,000	1,178,963,000
OTHS BUDGET	586,759,991	619,279,256	665,100,000	709,230,000
TOTAL	4,159,341,086	4,386,035,006	4,551,900,000	4,640,639,000

FISCAL YEAR	1994
JGSDF BUDGET	1,702,702,000
JMSDF BUDGET	1,110,515,000
JASDF BUDGET	1,133,515,000
OTHS BUDGET	736,816,000
TOTAL	4,683,548,000

Source : Kaijoujietai Yosan Jimuteiyou
(Kaijoubakuryoukanbu)

APPENDIX K.
TREND IN EACH SERVICE'S BUDGET AS A PERCENTAGE OF GNP IN JAPAN (BY ORGANIZATION)

FISCAL YEAR	1974	1975	1976	1977	1978
JGSDF BUDGET	0.332%	0.351%	0.388%	0.370%	0.379%
JMSDF BUDGET	0.182%	0.169%	0.187%	0.185%	0.200%
JASDF BUDGET	0.213%	0.212%	0.215%	0.214%	0.208%
OTHER'S BUDGET	0.105%	0.105%	0.110%	0.107%	0.115%
TOTAL	0.831%	0.837%	0.900%	0.877%	0.903%

FISCAL YEAR	1979	1980	1981	1982	1983
JGSDF BUDGET	0.371%	0.358%	0.357%	0.356%	0.365%
JMSDF BUDGET	0.196%	0.206%	0.209%	0.170%	0.232%
JASDF BUDGET	0.208%	0.208%	0.213%	0.229%	0.248%
OTHER'S BUDGET	0.128%	0.129%	0.128%	0.131%	0.133%
TOTAL	0.903%	0.900%	0.906%	0.933%	0.978%

FISCAL YEAR	1984	1985	1986	1987	1988
JGSDF BUDGET	0.364%	0.369%	0.371%	0.367%	0.364%
JMSDF BUDGET	0.239%	0.233%	0.236%	0.246%	0.258%
JASDF BUDGET	0.256%	0.263%	0.259%	0.256%	0.256%
OTHER'S BUDGET	0.133%	0.132%	0.128%	0.135%	0.136%
TOTAL	0.991%	0.997%	0.993%	1.004%	1.013%

FISCAL YEAR	1989	1990	1991	1992	1993
JGSDF BUDGET	0.354%	0.354%	0.340%	0.338%	0.337%
JMSDF BUDGET	0.249%	0.234%	0.236%	0.227%	0.219%
JASDF BUDGET	0.264%	0.269%	0.243%	0.238%	0.238%
OTHER'S BUDGET	0.138%	0.141%	0.135%	0.138%	0.143%
TOTAL	1.006%	0.997%	0.954%	0.941%	0.937%

FISCAL YEAR	1994
JGSDF BUDGET	0.345%
JMSDF BUDGET	0.225%
JASDF BUDGET	0.229%
OTHER'S BUDGET	0.149%
TOTAL	0.948%

Source : Kaijoujietai Yosan Jimuteiyou

APPENDIX L.
TREND IN JMSDF BUDGET (BY 3 COMPONENTS)

FISCAL YEAR	1955	1956	1957	1958	1959	1960	1961	1962
1. Personnel & Provisions	3,751,705	5,551,961	6,688,630	7,106,355	8,121,650	9,586,280	11,382,979	13,734,107
Personnel	**	**	**	**	**	**	**	**
Provisions	**	**	**	**	**	**	**	**
2. Flot-Line	5,544,680	8,165,571	5,200,543	7,133,104	11,267,817	13,480,314	15,014,571	14,436,714
Ship	5,544,680	7,804,378	5,200,543	6,711,416	8,195,824	9,460,712	8,005,970	6,967,694
Aircraft	0	361,193	0	421,688	3,073,243	3,984,413	6,011,726	6,016,785
Amunition	0	0	0	0	1,740	35,189	996,875	1,452,235
3. Others	9,715,952	9,137,007	10,035,936	11,430,341	12,813,561	13,525,306	16,025,476	19,295,435
4. TOTAL	19,012,337	22,854,539	21,925,109	25,669,800	32,203,028	36,591,900	42,423,026	47,466,256

FISCAL YEAR	1963	1964	1965	1966	1967	1968	1969	1970
1. Personnel & Provisions	16,024,315	18,964,681	22,702,398	25,731,298	28,931,137	33,429,846	38,523,576	45,595,607
Personnel	**	**	**	**	**	**	**	**
Provisions	**	**	**	**	**	**	**	**
2. Flot-Line	13,305,675	16,520,257	19,933,305	20,398,770	23,371,295	27,669,137	36,850,351	51,097,600
Ship	9,526,228	10,717,186	13,657,606	14,836,034	17,220,429	18,751,384	21,071,000	22,815,329
Aircraft	2,270,371	3,960,605	4,055,427	3,348,111	3,497,407	6,314,583	13,030,092	25,329,498
Amunition	1,509,076	1,842,466	2,216,272	2,214,625	2,653,459	2,603,170	2,749,259	29,527,732
3. Others	22,504,971	22,556,593	25,426,287	28,914,099	32,693,402	36,170,624	39,033,417	42,587,984
4. TOTAL	51,834,961	58,041,531	68,061,990	75,044,167	84,995,834	97,269,607	114,407,344	139,281,191

FISCAL YEAR	1971	1972	1973	1974	1975	1976	1977	1978
1. Personnel & Provisions	54,233,668	64,296,981	76,188,068	94,699,262	122,846,066	149,937,055	163,262,653	179,762,677
Personnel	50,738,044	60,446,785	71,863,917	89,787,989	117,101,727	143,507,653	156,835,786	172,738,026
Provisions	3,495,624	3,850,196	4,324,151	4,911,273	5,744,339	6,429,402	6,426,867	7,024,651
2. Flot-Line	64,076,797	74,074,522	76,220,965	76,302,541	67,798,003	79,282,791	94,825,664	122,036,601
Ship	30,463,008	35,369,449	36,573,559	43,439,980	30,505,971	45,435,678	54,778,854	80,355,593
Aircraft	30,001,167	34,986,618	35,519,312	28,196,529	32,013,465	27,302,695	32,247,862	34,760,293
Amunition	3,612,622	3,718,455	412,094	4,666,032	5,278,567	6,544,418	7,798,948	6,920,715
3. Others	43,909,630	49,491,948	62,043,894	67,990,764	77,403,452	84,831,154	99,067,873	119,309,580
4. TOTAL	162,220,095	187,863,451	214,452,927	238,992,567	268,047,521	314,051,000	357,156,190	421,108,858

FISCAL YEAR	1979	1980	1981	1982	1983	1984	1985	1986
1. Personnel & Provisions	185,334,281	191,297,957	203,530,509	219,986,573	221,455,053	241,612,693	258,862,767	282,669,825
Personnel	178,487,242	183,657,108	195,220,126	211,933,374	213,610,019	233,337,365	250,243,013	273,905,609
Provisions	6,847,039	7,640,849	8,310,383	8,053,199	7,845,034	8,275,328	8,619,754	8,764,216
2. Flot-Line	129,895,952	159,706,698	184,520,099	205,031,650	224,606,414	280,595,496	278,395,331	313,741,813
Ship	90,752,394	116,159,631	129,848,344	129,010,634	145,533,804	167,256,728	167,226,780	173,761,134
Aircraft	29,969,429	33,770,764	44,384,208	61,917,254	63,562,177	94,498,117	89,744,488	113,136,954
Amunition	9,164,129	9,776,303	10,287,547	14,103,762	15,510,433	18,840,651	21,424,063	26,843,725
3. Others	138,783,614	158,652,455	165,112,304	177,884,036	207,975,650	183,775,385	196,008,477	196,874,686
4. TOTAL	454,003,847	509,657,110	553,162,912	602,902,259	654,037,117	705,983,574	733,266,575	793,286,424

FISCAL YEAR	1987	1988	1989	1990	1991	1992	1993
1. Personnel & Provisions	301,154,057	310,677,258	311,969,791	317,413,953	331,612,132	352,070,892	365,255,946
Personnel	292,709,296	301,411,255	302,651,459	307,889,707	323,319,513	344,950,847	357,982,462
Provisions	8,984,801	9,266,003	9,318,332	9,524,246	8,292,619	7,120,045	7,273,484
2. Flot-Line	338,066,676	383,589,887	365,232,202	317,391,989	424,201,821	367,768,428	351,512,700
Ship	171,185,059	197,900,806	186,803,025	140,526,832	190,080,170	166,575,259	176,908,526
Aircraft	136,201,730	154,620,946	142,162,227	133,067,936	181,779,526	155,759,020	128,925,907
Amunition	30,679,887	31,068,135	36,266,950	43,797,221	53,342,125	45,434,149	45,678,265
3. Others	222,287,431	246,481,678	294,357,843	341,216,641	329,569,251	380,315,090	368,137,119
4. TOTAL	861,548,204	940,748,823	971,559,836	976,022,583	1,085,383,204	1,100,154,410	1,084,905,765

Source : Kaijoujietai Yosan Jimuteiyon (Kaijoubakuryoukanbu)

APPENDIX M. TREND IN JMSDF TYPICAL WAGES (BY RANK)

Year	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Rank													
CPT	62,200	65,400	68,600	72,700	81,400	85,000	89,500	96,500	103,300	137,900	153,900	168,200	162,500
CDR	52,300	55,500	58,400	62,400	69,400	77,900	82,500	89,000	97,700	116,700	130,000	143,500	157,300
LCDR	46,000	49,000	53,800	57,800	64,300	72,200	76,500	82,600	89,200	105,300	117,400	130,600	143,700
LT	39,600	42,100	46,700	49,700	56,200	59,800	63,100	68,000	73,500	83,700	93,000	103,400	113,400
LTJG	31,900	34,100	40,800	43,600	49,500	52,400	55,600	59,800	64,600	58,100	66,100	74,600	82,800
ENS	29,800	31,900	38,400	41,100	45,100	47,700	50,500	54,200	58,800	49,300	57,000	64,700	72,200
WO	-	-	-	-	-	-	-	-	-	-	90,300	103,800	115,100
MPO	-	-	-	-	-	-	-	-	-	-	-	-	-
PO1	29,785	31,800	37,850	40,575	44,710	47,340	50,170	53,880	58,520	77,900	77,900	87,700	67,100
PO2	24,100	23,300	27,700	29,600	32,400	34,300	36,400	39,100	42,500	49,600	56,900	62,600	69,300
PO3	16,800	17,800	21,600	23,200	25,400	27,600	29,400	33,200	36,300	41,300	48,200	55,200	61,800
LS	11,900	12,900	14,400	15,700	17,400	19,100	20,400	21,900	24,300	30,800	37,300	43,400	49,500
SN	9,100	10,000	11,500	12,800	14,400	16,100	17,300	18,700	20,800	26,400	32,300	37,300	45,000
SA	7,600	8,600	10,100	11,400	12,800	14,100	15,100	15,900	17,600	20,500	25,100	30,000	35,600

Year	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Rank													
CPT	211,200	270,800	296,700	317,400	339,800	351,100	362,300	377,300	395,100	396,900	404,500	418,200	441,900
CDR	179,600	231,600	255,900	274,600	294,400	305,600	316,700	331,200	347,500	348,800	355,900	367,500	398,300
LCDR	166,000	214,900	238,100	255,000	273,500	283,700	294,000	307,700	323,100	324,000	330,400	341,200	372,000
LT	130,800	169,100	187,400	200,800	214,900	233,300	231,700	242,500	255,100	255,600	260,900	270,000	286,200
LTJG	96,800	125,800	139,600	149,600	160,200	166,400	172,700	180,900	190,800	191,200	195,300	202,300	213,800
ENS	84,900	110,800	123,100	131,600	141,000	146,400	152,000	158,900	167,600	167,800	171,300	177,400	187,500
WO	134,400	178,600	203,300	223,400	245,000	259,300	274,300	297,200	312,200	312,600	324,000	340,000	363,700
MPO	-	183,200	207,100	236,900	254,700	264,300	273,900	286,300	300,900	301,300	307,300	317,900	336,600
PO1	114,300	148,800	164,000	185,100	199,300	206,800	214,300	224,000	235,200	236,600	241,100	249,700	264,600
PO2	86,100	112,600	124,200	143,300	153,400	159,500	201,300	173,300	182,800	183,200	186,800	193,400	204,500
PO3	80,100	105,900	107,300	125,300	134,100	139,400	144,700	151,300	159,500	159,800	163,000	168,700	178,700
LS	59,500	79,000	86,900	103,500	110,700	114,400	118,400	123,300	130,000	130,100	132,700	137,400	145,200
SN	54,300	72,000	79,000	94,800	101,300	104,600	107,900	112,200	117,800	118,000	120,200	124,200	131,200
SA	43,500	58,200	64,000	78,500	83,700	85,800	88,400	91,600	96,000	96,200	98,000	101,400	107,400

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994
Rank									
CPT	452,600	459,400	470,100	483,500	499,000	513,300	521,400	528,300	533,700
CDR	407,400	413,300	423,500	436,400	450,500	464,700	472,900	479,900	484,500
LCDR	380,600	386,300	395,600	407,200	420,200	434,300	442,700	449,800	454,500
LT	293,200	297,600	305,300	314,800	325,800	337,400	346,300	353,500	357,900
LTJG	218,900	222,200	227,800	235,500	244,300	257,300	266,000	271,500	275,000
ENS	191,900	194,900	200,000	207,200	218,100	231,300	239,800	245,000	244,000
WO	377,200	382,900	392,900	404,200	427,600	441,600	451,000	459,600	459,800
MPO	344,900	350,500	359,900	370,700	383,700	396,200	405,900	414,000	419,100
PO1	271,000	275,200	282,300	291,800	302,400	313,300	322,800	329,500	333,400
PO2	209,400	212,700	218,300	225,600	234,500	246,800	256,300	261,700	265,200
PO3	183,000	185,900	191,000	198,200	209,500	222,700	231,700	236,700	239,500
LS	148,800	151,500	148,100	154,700	168,100	179,200	198,100	193,300	183,500
SN	134,300	136,800	140,800	146,800	157,800	168,000	177,500	181,500	204,800
SA	110,200	112,400	115,800	121,000	133,900	142,800	151,800	162,500	164,300

Source : JIEDAN HOUKYU HYOU 1960-1994 (Defense Agency)

APPENDIX N. TREND IN RECRUITMENT OF JSDF PERSONNEL (BY SERVICE)

Year	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
service											
JGSDF	plan 23,500	22,050	20,500	22,000	22,200	22,200	23,000	22,885	21,531	19,000	19,200
	applicant 103,961	69,085	64,820	64,761	47,830	45,600	46,683	42,991	42,340	39,816	40,948
	enrollment 25,179	17,556	21,881	22,008	22,290	22,843	24,144	22,964	21,918	19,000	19,420
	appl/enroll 4.1	3.9	3.0	2.9	2.1	2.0	1.9	1.9	1.9	2.1	2.1
	enroll/plan 107.1%	79.6%	106.7%	100.0%	100.4%	102.9%	105.0%	100.3%	101.8%	100.0%	101.1%
JMSDF	plan 3,450	1,700	3,250	4,150	1,835	4,190	4,312	4,665	4,850	4,669	3,919
	applicant 22,836	5,558	11,600	14,092	6,949	9,109	9,920	8,307	9,548	9,581	7,758
	enrollment 3,828	1,414	3,662	4,441	1,853	4,444	4,515	4,450	4,936	4,688	3,762
	appl/enroll 6.0	3.9	3.2	3.2	3.8	2.0	2.2	1.9	1.9	2.0	2.1
	enroll/plan 111.0%	83.2%	112.7%	107.0%	101.0%	106.1%	104.7%	96.2%	101.8%	100.4%	96.0%
JASDF	plan 5,100	3,850	4,671	4,175	3,250	4,909	4,512	5,063	5,619	3,481	4,180
	applicant 23,277	15,175	12,805	11,344	7,805	8,821	9,168	8,909	11,177	7,785	8,278
	enrollment 5,929	3,719	4,983	4,311	3,185	5,082	5,103	5,215	5,945	3,488	4,212
	appl/enroll 3.9	4.1	2.6	2.6	2.5	1.7	1.8	1.7	1.9	2.2	2.0
	enroll/plan 116.3%	96.6%	106.7%	103.3%	98.0%	103.5%	113.1%	103.0%	105.8%	100.2%	100.8%
Total	plan 32,050	27,600	28,421	30,325	27,285	31,299	31,824	32,613	32,000	27,150	27,299
	applicant 150,074	89,818	89,225	90,197	62,584	64,530	65,771	60,207	63,065	57,182	56,984
	enrollment 34,936	22,689	30,526	30,760	27,328	32,369	33,762	32,669	32,799	27,176	27,394
	appl/enroll 4.3	4.0	2.9	2.9	2.3	2.0	1.9	1.8	1.9	2.1	2.1
	enroll/plan 109.0%	82.2%	107.4%	101.4%	100.2%	103.4%	106.1%	100.2%	102.5%	100.1%	100.3%

Year	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
service											
JGSDF	plan 19,400	18,300	14,371	15,120	15,400	14,180	15,950	15,600	16,150	14,980	13,633
	applicant 45,199	42,430	32,476	32,171	33,942	30,177	32,280	30,768	33,673	31,583	29,860
	enrollment 21,024	18,533	14,371	15,161	15,388	14,201	16,582	15,505	15,670	13,767	13,331
	appl/enroll 2.1	2.3	2.3	2.1	2.2	2.1	1.9	2.0	2.1	2.3	2.2
	enroll/plan 108.4%	101.3%	100.0%	100.3%	99.9%	100.1%	104.0%	99.4%	97.9%	91.9%	97.8%
JMSDF	plan 5,300	5,000	3,255	1,136	3,618	2,100	1,836	3,520	3,520	2,394	3,236
	applicant 10,244	12,700	8,197	3,488	5,738	4,251	3,857	5,762	6,294	3,815	5,043
	enrollment 4,736	5,384	3,255	1,140	3,684	2,101	1,728	3,195	2,585	1,524	3,297
	appl/enroll 2.2	2.4	2.5	3.1	1.6	2.0	2.2	1.8	2.4	2.5	1.5
	enroll/plan 89.4%	107.7%	100.0%	100.4%	101.8%	100.0%	94.1%	90.8%	145.3%	63.7%	101.9%
JASDF	plan 5,100	4,800	3,262	1,127	3,630	2,080	2,025	2,850	1,981	2,440	4,275
	applicant 11,277	13,002	9,002	4,399	6,477	5,624	5,344	6,506	6,847	4,799	6,391
	enrollment 5,214	5,387	3,262	1,129	3,617	2,087	2,224	3,055	2,457	735	4,203
	appl/enroll 2.2	2.4	2.8	3.9	1.8	2.7	2.4	2.1	2.8	6.5	1.5
	enroll/plan 102.2%	112.2%	100.0%	100.2%	99.6%	100.3%	109.8%	107.2%	124.0%	30.1%	98.3%
Total	plan 29,800	28,100	20,888	17,383	22,648	18,360	19,811	21,970	19,910	19,814	21,144
	applicant 66,720	68,132	49,675	40,058	46,157	40,052	41,481	43,036	46,814	40,197	41,294
	enrollment 30,974	29,304	20,888	17,430	22,689	18,389	20,534	21,755	20,712	16,026	20,831
	appl/enroll 2.2	2.3	2.4	2.3	2.0	2.2	2.0	2.0	2.3	2.5	2.0
	enroll/plan 103.9%	104.3%	100.0%	100.3%	100.2%	100.2%	103.6%	99.0%	104.0%	80.9%	98.5%

Year	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
service										
JGSDF	plan 14,630	16,100	16,068	14,793	15,663	14,951	14,457	14,726	10,240	8,801
	applicant 31,242	34,832	35,197	34,000	30,908	29,226	24,267	23,986	20,528	13,508
	enrollment 14,733	16,114	15,502	14,517	15,721	14,942	6,664	13,193	6,695	2,730
	appl/enroll 2.1	2.2	2.3	2.3	2.0	2.0	3.6	1.8	3.1	4.9
	enroll/plan 100.7%	100.1%	96.5%	98.1%	100.4%	99.9%	46.1%	89.6%	65.4%	31.0%
JMSDF	plan 2,406	2,481	2,209	3,359	3,398	3,224	2,954	3,330	1,720	1,760
	applicant 6,816	4,327	5,152	6,197	5,595	5,938	5,412	4,966	3,568	2,445
	enrollment 2,652	2,093	2,087	3,358	3,251	3,098	1,620	2,710	319	901
	appl/enroll 2.5	2.4	2.5	1.8	1.7	1.9	3.3	1.8	11.2	2.7
	enroll/plan 110.2%	84.4%	94.5%	100.0%	95.7%	96.1%	54.8%	81.4%	18.5%	51.2%
JASDF	plan 2,007	2,636	1,564	1,761	3,956	1,836	1,905	3,800	1,700	2,700
	applicant 5,425	5,500	5,720	5,385	6,688	5,465	4,451	6,866	5,738	3,810
	enrollment 738	2,720	1,562	1,758	3,903	2,220	221	3,685	1,145	1,150
	appl/enroll 7.4	2.0	3.7	3.1	1.7	2.5	20.1	1.9	5.0	3.3
	enroll/plan 36.8%	103.2%	99.9%	99.8%	98.7%	120.9%	11.6%	97.0%	67.4%	42.6%
Total	plan 19,043	21,217	19,841	19,913	23,017	20,011	19,316	21,856	13,660	13,261
	applicant 43,283	45,259	46,069	45,582	43,191	40,629	34,130	35,818	29,834	19,763
	enrollment 18,123	20,927	19,151	19,633	22,875	20,260	8,505	19,588	8,159	4,781
	appl/enroll 2.4	2.2	2.4	2.3	1.9	2.0	4.0	1.8	3.7	4.1
	enroll/plan 95.2%	98.6%	96.5%	98.6%	99.4%	101.2%	44.0%	89.6%	59.7%	36.1%

Source: BOUEI HANDBOOK (ASAGUMI SHINBUNSHA)
JINJI JYUNPOU (Defense Agency)

APPENDIX O.
TREND IN SHIP'S COMPLEMENT (BY TYPE)

Year	Type	Name	DISPL.	COMPL.	COMPL. / DISPL.
1962	DD	YAMAGUMO	2,050	220	0.107
1963	DD	TAKATSUKI	3,100	260	0.084
1963	DD	MAKIGUMO	2,050	210	0.102
1964	DD	KIKUZUKI	3,050	260	0.085
1964	DD	ASAGUMO	2,050	210	0.102
1965	DD	MOTIZUKI	3,100	270	0.087
1965	DD	MINEGUMO	2,100	220	0.105
1966	DD	NAGATSUKI	3,100	270	0.087
1966	DD	NATSUGUMO	2,100	210	0.100
1967	DD	MURAKUMO	2,150	220	0.102
1969	DD	AOKUMO	2,150	220	0.102
1971	DD	ASAGUMO	2,150	210	0.098
1974	DD	YUGUMO	2,150	220	0.102
1977	DD	HATSUYUKI	2,950	200	0.068
1978	DD	SHIRAYUKI	2,950	200	0.068
1979	DD	MINEYUKI	2,950	200	0.068
1979	DD	SAWAYUKI	2,950	200	0.068
1979	DD	HAMAYUKI	2,950	200	0.068
1980	DD	ISOYUKI	2,950	200	0.068
1980	DD	HARUYUKI	2,950	200	0.068
1981	DD	YAMAYUKI	3,050	200	0.066
1981	DD	MATSUYUKI	3,050	200	0.066
1982	DD	SETOYUKI	3,050	200	0.066
1982	DD	ASAYUKI	3,050	200	0.066
1982	DD	SHIMAYUKI	3,050	200	0.066
1983	DD	ASAGIRI	3,500	220	0.063
1984	DD	YAMAGIRI	3,500	220	0.063
1984	DD	YUGIRI	3,500	220	0.063
1984	DD	AMAGIRI	3,500	220	0.063
1985	DD	HAMAGIRI	3,550	220	0.062
1985	DD	SETOGIRI	3,550	220	0.062
1985	DD	SAWAGIRI	3,550	220	0.062
1986	DD	UMIGIRI	3,550	220	0.062
1991	DD	MURASAME	4,400	170	0.039
1960	DDG	AMATSUKAZE	3,050	290	0.095
1971	DDG	TACHIKAZE	3,850	250	0.065
1973	DDG	ASAKAZE	3,850	250	0.065
1978	DDG	SAWAKAZE	3,950	255	0.065
1981	DDG	HATAKAZE	4,600	260	0.057
1983	DDG	SHIMAKAZE	4,650	260	0.056
1988	DDG	KONGO	7,200	300	0.042
1990	DDG	KIRISHIMA	7,200	300	0.042
1991	DDG	MYOKO	7,200	300	0.042
1968	DDH	HARUNA	4,700	370	0.079
1970	DDH	HIEI	4,700	370	0.079
1975	DDH	SHIRANE	5,200	350	0.067
1976	DDH	KURAMA	5,200	360	0.069
1967	DE	TIKUGO	1470	165	0.112
1968	DE	AYASE	1480	165	0.111
1968	DE	MIKUMA	1470	165	0.112
1969	DE	TOKATI	1470	165	0.112
1970	DE	IWASE	1470	165	0.112
1970	DE	CHITOSE	1480	165	0.111
1971	DE	NIYODO	1470	165	0.112
1972	DE	TESHIO	1500	160	0.107
1972	DE	YOSHINO	1500	160	0.107
1972	DE	KUMANO	1500	165	0.110
1973	DE	NOSHIRO	1500	160	0.107
1977	DE	ISHIKARI	1290	90	0.070
1979	DE	YUBARI	1470	95	0.065

Year	Type	Name	DISPL.	COMPL.	COMPL. / DISPL.
1980	DE	YUBETSU	1470	95	0.065
1986	DE	ABUKUMA	2000	120	0.060
1986	DE	JINTSUU	2000	120	0.060
1987	DE	OOYODO	2000	120	0.060
1987	DE	SENDAI	2000	120	0.060
1989	DE	CHIKUMA	2000	120	0.060
1989	DE	TONE	2000	120	0.060
1967	SS	UZUSHIO	1,850	75	0.041
1968	SS	MAKISHIO	1,850	75	0.041
1969	SS	ISOSHIO	1,850	75	0.041
1970	SS	NARUSHIO	1,850	75	0.041
1971	SS	KUROSHIO	1,850	75	0.041
1972	SS	TAKASHIO	1,850	75	0.041
1973	SS	YAESHIO	1,850	75	0.041
1975	SS	YUSHIO	2,200	75	0.034
1977	SS	MOCHISHIO	2,200	75	0.034
1978	SS	SETOSHIO	2,200	75	0.034
1979	SS	OKISHIO	2,200	75	0.034
1980	SS	NADASHIO	2,250	75	0.033
1981	SS	HAMASHIO	2,250	75	0.033
1982	SS	AKISHIO	2,250	75	0.033
1983	SS	TAKESHIO	2,250	75	0.033
1984	SS	YUKISHIO	2,250	75	0.033
1985	SS	SACHISHIO	2,250	75	0.033
1986	SS	HAMASHIO	2,450	75	0.031
1987	SS	NATSUSHIO	2,450	75	0.031
1988	SS	HAYASHIO	2,450	75	0.029
1989	SS	ARASHIO	2,450	75	0.029
1990	SS	WAKASHIO	2,450	75	0.029
1991	SS	FUYUSHIO	2,450	75	0.029
1992	SS	04SS	2,450	75	0.029
1993	SS	05SS	2,500	70	0.028

Source : JANE'S FIGHTING SHIP
:KANTEI TO KOUKUUKI SHUU
(Kaijyou Jieitai Shinbun Sha)

APPENDIX P.
TREND IN JAPAN'S DEFENSE EXPENDITURES (BY EXPENSE)

FISCAL YEAR	1974	1975	1976	1977	1978
PERSONNEL & PROVISIONS	529,646,420	702,088,220	847,656,901	930,391,598	1,034,505,944
CURRENT-YEAR MATERIAL	304,785,726	352,767,151	372,498,221	408,649,106	468,851,617
CURRENT-YEAR OBLIGATORY OUTLAY	258,591,749	272,466,501	292,195,474	351,572,621	397,672,032
TOTAL	1,093,023,895	1,327,321,872	1,512,350,596	1,690,613,325	1,901,029,593

FISCAL YEAR	1979	1980	1981	1982	1983
PERSONNEL & PROVISIONS	1,076,450,985	1,099,977,831	1,144,369,784	1,205,311,648	1,225,824,750
CURRENT-YEAR MATERIAL	572,411,176	607,885,174	631,062,141	679,339,320	673,185,236
CURRENT-YEAR OBLIGATORY OUTLAY	445,627,130	522,339,473	624,586,984	701,484,503	855,224,397
TOTAL	2,094,489,291	2,230,202,478	2,400,018,909	2,586,135,471	2,754,234,383

FISCAL YEAR	1984	1985	1986	1987	1988
PERSONNEL & PROVISIONS	1,309,441,289	1,413,952,438	1,508,551,282	1,543,867,016	1,578,864,769
CURRENT-YEAR MATERIAL	642,070,591	649,725,434	665,137,387	708,593,611	770,487,217
CURRENT-YEAR OBLIGATORY OUTLAY	983,132,904	1,073,470,276	1,169,860,401	1,264,973,154	1,530,975,954
TOTAL	2,934,644,784	3,137,148,148	3,343,549,070	3,517,433,781	3,880,327,940

FISCAL YEAR	1989	1990	1991	1992	1993
PERSONNEL & PROVISIONS	1,613,580,741	1,668,028,636	1,756,766,471	1,880,769,818	1,939,563,630
CURRENT-YEAR MATERIAL	838,074,880	908,434,203	929,152,825	938,151,236	958,180,670
CURRENT-YEAR OBLIGATORY OUTLAY	1,467,178,674	1,582,878,247	1,700,115,710	1,732,918,169	1,747,894,974
TOTAL	3,918,834,295	4,159,341,086	4,386,035,006	4,551,839,223	4,645,639,274

Source : Kaijyoujietai Yosan Jimteiyon (Kaijyoubakuryoukanbu)

APPENDIX Q.
JMSDF SHIP INVENTORIES COMPARED WITH OTHER COUNTRIES

	RUSSIA		U.S.		US(PACIFIC)		FRANCE		U.K.	
	QTY	DISPLACEMENT (FULL TON)	QTY	DISPLACEMENT (FULL TON)	QTY	DISPLACEMENT (FULL TON)	QTY	DISPLACEMENT (FULL TON)	QTY	DISPLACEMENT (FULL TON)
SSBN	48	624,200	17	287,250	8	150,000	5	44,600	4	48,800
SSGN	22	215,000					6	16,020		
SSG	5	19,250								
SSN	53	374,500	85	534,398	30	183,562			12	65,800
SS	65	197,548					7	10,154	2	4,910
CV	2	112,000	11	978,493	6	533,412	2	65,560	2	41,200
CL	14	186,750	37	351,375	17	162,335	1	13,270		
DD	33	243,774	40	329,646	20	165,014	15	75,006	12	51,500
FF	139	263,900	35	139,342	13	52,376	24	41,200	24	107,600
MN	222	92,879	15	18,725			21	11,385	23	16,620
AM	72	233,234	42	828,585	25	474,235	9	40,650	1	16,950
TOTAL	675	2,564,035	282	3,467,814	119	1,720,934	90	317,845	80	353,380

	JAPAN		U.S. Ships Home ported in Japan		CHINA		NORTH KOREA		SOUTH KOREA	
	QTY	DISPLACEMENT (FULL TON)	QTY	DISPLACEMENT (FULL TON)	QTY	DISPLACEMENT (FULL TON)	QTY	DISPLACEMENT (FULL TON)	QTY	DISPLACEMENT (FULL TON)
SSBN					1	8,000				
SSGN										
SSG					1	2,100				
SSN					5	25,000				
SS	17	43,210			38	71,804	21	38,430	2	2,570
CV			1	80,643						
CL			2	18,932						
DD	41	160,635	3	24,120	18	66,590			7	24,290
FF	20	36,630	4	15,938	38	68,426	3	4,845	9	20,100
MN	35	24,485	4	83,289	68	30,353	29	1,740	14	6,130
AM	8	11,830			62	135,080	31	4,495	16	41,520
TOTAL	121	276,790	14	222,922	231	407,353	84	49,510	48	94,610
(MIDGEM SS)							60	5,400	11	1,189
(CORVETTES)							5	3,110	27	32,364
(TOTAL)							149	58,020	86	128,163

Source : JANE'S FIGHTING SHIP 1994-95

APPENDIX R.
SHIP BUILD LINE(1/5)

	SHIP	BUILT	COMPL.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
SS	YUUSHIO 1980	75	1	75											
	MOTISHIO 1981	75	1	75	1	75									
	SETOSHIO 1982	75	1	75	1	75	1	75							
	OKISHIO 1983	75	1	75	1	75	1	75	1	75					
	WADASHIO 1984	75	1	75	1	75	1	75	1	75	1	75			
	HAKASHIO 1985	75	1	75	1	75	1	75	1	75	1	75			
	AKISHIO 1986	75	1	75	1	75	1	75	1	75	1	75	1	75	
	DAKASHIO 1987	75	1	75	1	75	1	75	1	75	1	75	1	75	
	YUKUSHIO 1988	75	1	75	1	75	1	75	1	75	1	75	1	75	
	SATISHIO 1989	75	1	75	1	75	1	75	1	75	1	75	1	75	1
	HARUSHIO 1990	75	1	75	1	75	1	75	1	75	1	75	1	75	1
	NATSUSHIO 1991	75	1	75	1	75	1	75	1	75	1	75	1	75	1
	HAYASHIO 1992	75	1	75	1	75	1	75	1	75	1	75	1	75	1
	ARASHIO 1993	75	1	75	1	75	1	75	1	75	1	75	1	75	1
	WAKASHIO 1994	75	1	75	1	75	1	75	1	75	1	75	1	75	1
	HUYUSHIO 1995	75	1	75	1	75	1	75	1	75	1	75	1	75	1
	04SS 1996	75			1	75	1	75	1	75	1	75	1	75	1
	05SS 1997	70					1	70	1	70	1	70	1	70	1
	06SS 1998	70						1	70	1	70	1	70	1	
	07SS 1999	70							1	70	1	70	1	70	1
	08SS 2000	70								1	70	1	70	1	
	09SS 2001	70									1	70	1	70	1
	10SS 2002	70										1	70	1	
	11SS 2003	70											1	70	1
	12SS 2004	70												1	70
	13SS 2005	70													1
	14SS 2006	70													
	15SS 2007	70													
16SS 2008	70														
17SS 2009	70														
18SS 2010	70														
19SS 2011	70														
20SS 2012	70														
21SS 2013	70														
22SS 2014	70														
23SS 2015	70														
24SS 2016	70														
25SS 2017	70														
26SS 2018	70														
27SS 2019	70														
28SS 2020	70														
	SUBTOTAL			16	1,200	16	1,200	16	1,195	16	1,190	16	1,185	16	1,180

[illegible]

SHIP BUILD LINE (2/5)

SHIP	BUILT	COMPL.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006												
DD TAKATSUKI	1967	260	1	260	1	260	1	260																		
KIKUZUKI	1968	260	1	260	1	260	1	260																		
MINEGUMO	1968	210	1	210	1	210	1	210																		
MOTIZUKI	1969	270	1	270	1	270	1	270	1	270																
NATSUGUMO	1969	210	1	210	1	210	1	210	1	210																
NAGATSUKI	1970	270	1	270	1	270	1	270	1	270																
MURAKUMO	1970	220	1	220	1	220	1	220	1	220																
AKOUMO	1972	210	1	210	1	210	1	210	1	210	1	210														
AKIGUMO	1974	220	1	220	1	220	1	220	1	220	1	220	1	220												
YUUGUMO	1978	220	1	220	1	220	1	220	1	220	1	220	1	220												
HATSUYUKI	1982	200	1	200	1	200	1	200	1	200	1	200	1	200												
SHIRAYUKI	1983	200	1	200	1	200	1	200	1	200	1	200	1	200												
MINEYUKI	1984	200	1	200	1	200	1	200	1	200	1	200	1	200												
SAWAYUKI	1984	200	1	200	1	200	1	200	1	200	1	200	1	200												
HAMAYUKI	1983	200	1	200	1	200	1	200	1	200	1	200	1	200												
ISOYUKI	1985	200	1	200	1	200	1	200	1	200	1	200	1	200												
HARUYUKI	1985	200	1	200	1	200	1	200	1	200	1	200	1	200												
YAMAYUKI	1985	200	1	200	1	200	1	200	1	200	1	200	1	200												
NATSUYUKI	1986	200	1	200	1	200	1	200	1	200	1	200	1	200												
SETOYUKI	1986	200	1	200	1	200	1	200	1	200	1	200	1	200												
ASAYUKI	1987	200	1	200	1	200	1	200	1	200	1	200	1	200												
SHIMAYUKI	1987	200	1	200	1	200	1	200	1	200	1	200	1	200												
ASAGIRI	1988	220	1	220	1	220	1	220	1	220	1	220	1	220												
YAMAGIRI	1989	220	1	220	1	220	1	220	1	220	1	220	1	220												
YUUGIRI	1989	220	1	220	1	220	1	220	1	220	1	220	1	220												
AMAGIRI	1989	220	1	220	1	220	1	220	1	220	1	220	1	220												
HAMAGIRI	1990	220	1	220	1	220	1	220	1	220	1	220	1	220												
SETOGIRI	1990	220	1	220	1	220	1	220	1	220	1	220	1	220												
SAMAGIRI	1990	220	1	220	1	220	1	220	1	220	1	220	1	220												
UMIGIRI	1990	220	1	220	1	220	1	220	1	220	1	220	1	220												
HARUSAME	1996	170		1	170	1	170	1	170	1	170	1	170	1												
0400	1997	170			1	170	1	170	1	170	1	170	1	170												
0600	1999	170				1	170	1	170	1	170	1	170	1												
0600	1999	170					1	170	1	170	1	170	1	170												
0700	2000	170						1	170	1	170	1	170	1												
0700	2000	170						1	170	1	170	1	170	1												
0800	2001	170							1	170	1	170	1	170												
0900	2002	170								1	170	1	170	1												
1000	2003	170									1	170	1	170												
1000	2003	170										1	170	1												
1100	2004	170											1	170												
1200	2005	170												1												
1200	2005	170												1												
1300	2006	170												1												
1300	2006	170												1												
1400	2007	170												1												
1500	2008	170												1												
1600	2009	170												1												
1900	2012	170												1												
2000	2013	170												1												
2100	2014	170												1												
2100	2014	170												1												
2200	2015	170												1												
2200	2015	170												1												
2300	2016	170												1												
2300	2016	170												1												
2400	2017	170												1												
2500	2018	170												1												
2500	2018	170												1												
2600	2019	170												1												
2700	2020	170												1												
2700	2020	170												1												
SUBTOTAL			30	6,510	31	6,680	32	6,850	31	6,590	31	6,460	31	6,320	30	6,000	31	6,170	32	6,300	33	6,470	34	6,590	36	6,930

SHIP BUILD LINE(2/5)

[illegible]

SHIP BUILD LINE (3/5)

SHIP	BUILT	COMPL.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
DDG	AMATSUKAZE	1965	290	1	290									
	TATIKAZE	1976	250	1	250	1	250	1	250	1	250	1	250	1
	ASAKAZE	1979	250	1	250	1	250	1	250	1	250	1	250	1
	SAWAKAZE	1983	225	1	225	1	225	1	225	1	225	1	225	1
	HATAKAZE	1986	260	1	260	1	260	1	260	1	260	1	260	1
	SHINAKAZE	1988	260	1	260	1	260	1	260	1	260	1	260	1
	KONGOU	1993	300	1	300	1	300	1	300	1	300	1	300	1
	KIRISHIMA	1995	300	1	300	1	300	1	300	1	300	1	300	1
	03DDG	1996	300											
	05DDG	1998	300											
SUBTOTAL			8	2,135	8	2,145	8	2,145	9	2,445	9	2,445	9	2,445
DDH	HARUNA	1973	370	1	370	1	370	1	370	1	370	1	370	1
	HIEI	1974	370	1	370	1	370	1	370	1	370	1	370	1
	SHIRANE	1980	350	1	350	1	350	1	350	1	350	1	350	1
	KURAMA	1981	360	1	360	1	360	1	360	1	360	1	360	1
	11DDH	2004	300											
	12DDH	2005	300											
	17DDH	2010	300											
	18DDH	2011	300											
SUBTOTAL			4	1,450	4	1,450	4	1,450	4	1,450	4	1,450	4	1,310
DE	CHIKUGO	1970	165	1	165	1	165	1	165	1	165	1	165	1
	AYASE	1971	165	1	165	1	165	1	165	1	165	1	165	1
	MIKUMA	1971	165	1	165	1	165	1	165	1	165	1	165	1
	TOKACHI	1972	165	1	165	1	165	1	165	1	165	1	165	1
	IMASE	1972	165	1	165	1	165	1	165	1	165	1	165	1
	CHITOSE	1973	165	1	165	1	165	1	165	1	165	1	165	1
	NIYODO	1974	165	1	165	1	165	1	165	1	165	1	165	1
	TESHIO	1975	160	1	160	1	160	1	160	1	160	1	160	1
	YOSHINO	1975	160	1	160	1	160	1	160	1	160	1	160	1
	KURANO	1975	165	1	165	1	165	1	165	1	165	1	165	1
	HOSHIO	1977	160	1	160	1	160	1	160	1	160	1	160	1
	TSUKIKARI	1981	90	1	90	1	90	1	90	1	90	1	90	1
	YUUBARI	1983	95	1	95	1	95	1	95	1	95	1	95	1
	YUUBETSU	1984	95	1	95	1	95	1	95	1	95	1	95	1
	ABUKUMA	1989	120	1	120	1	120	1	120	1	120	1	120	1
	JDKTUU	1990	120	1	120	1	120	1	120	1	120	1	120	1
	OYOODO	1991	120	1	120	1	120	1	120	1	120	1	120	1
	SENDAY	1991	120	1	120	1	120	1	120	1	120	1	120	1
	CHIKUMA	1993	120	1	120	1	120	1	120	1	120	1	120	1
	TONE	1993	120	1	120	1	120	1	120	1	120	1	120	1
	11DE	2002	120											
	12DE	2003	120											
	15DE	2006	120											
	18DE	2009	120											
	23DE	2014	120											
	24DE	2015	120											
	24DE	2015	120											
	25DE	2016	120											
	26DE	2017	120											
	27DE	2018	120											
	27DE	2018	120											
	28DE	2019	120											
	29DE	2020	120											
SUBTOTAL			20	2,800	20	2,800	20	2,800	20	2,800	19	2,635	18	2,305
TOTAL			32	6,385	32	6,395	32	6,395	33	6,695	32	6,530	31	6,200

SHIP BUILD LINE(3/5)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	250	1 250												
1	225	1 225	1 225	1 225	1 225	1 225	1 225							
1	260	1 260	1 260	1 260	1 260	1 260	1 260	1 260	1 260	1 260				
1	260	1 260	1 260	1 260	1 260	1 260	1 260	1 260	1 260	1 260	1 260			
1	300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300
1	300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300
1	300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300
1	300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300
8	2,195	8 2,195	7 1,945	7 1,945	7 1,945	7 1,945	7 1,945	6 1,720	6 1,720	6 1,720	5 1,460	4 1,200	4 1,200	4 1,200
1	350	1 350	1 350	1 350										
1	360	1 360	1 360	1 360	1 360									
1	300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300
1	300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300
				1 360	1 300	1 360	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300
					1 300	1 360	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300
4	1,310	4 1,310	4 1,310	5 1,610	5 1,560	4 1,200	4 1,200	4 1,200	4 1,200	4 1,200	4 1,200	4 1,200	4 1,200	4 1,200
1	90	1 90	1 90	1 90	1 90									
1	95	1 95	1 95	1 95	1 95	1 95	1 95							
1	95	1 95	1 95	1 95	1 95	1 95	1 95	1 95						
1	120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120
1	120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120
1	120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120
1	120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120
1	120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120
1	120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120
1	120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120
1	120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120	1 120
13	1,520	12 1,360	13 1,480	13 1,480	13 1,480	12 1,390	12 1,390	12 1,415	13 1,560	14 1,680	15 1,800	17 2,040	18 2,160	18 2,160
25	5,025	24 4,865	24 4,735	25 5,035	25 4,985	23 4,535	23 4,535	22 4,335	23 4,480	24 4,600	24 4,460	25 4,440	26 4,560	26 4,560

SHIP BUILD LINE (4/5)

	SHIP	BUILT	COMPL.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
MSC	HASHIDA	1978	45	1	45	1	45	1	45							
	TMAT	1978	45	1	45	1	45	1	45							
	HATSUMIDA	1979	45	1	45	1	45	1	45	1						
	NIDOSHIDA	1979	45	1	45	1	45	1	45	1						
	MIYAJIMA	1980	45	1	45	1	45	1	45	1	45					
	ENOSHIDA	1980	45	1	45	1	45	1	45	1	45	1				
	UKISHIDA	1980	45	1	45	1	45	1	45	1	45	1				
	OOSHIDA	1981	45	1	45	1	45	1	45	1	45	1	45			
	NILJIDA	1981	45	1	45	1	45	1	45	1	45	1	45	1		
	YAKUSHIDA	1982	45	1	45	1	45	1	45	1	45	1	45	1		
	KAKUSHIDA	1982	45	1	45	1	45	1	45	1	45	1	45	1	45	
	CHIKUSHIDA	1983	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	TOHSHIDA	1983	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	HAHAJIMA	1984	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	TAKASHIDA	1984	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	MURAJIMA	1985	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	ETAJIMA	1985	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	KAMISHIDA	1986	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	HIDESHIDA	1986	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	OGISHIDA	1987	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	MOROSHIDA	1987	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	YURISHIDA	1988	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	HIDKOSHIDA	1988	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	AMASHIDA	1989	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	SAKUSHIDA	1989	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	UNAJIMA	1990	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	TESHIDA	1990	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	TSUKUSHIDA	1993	45	1	45	1	45	1	45	1	45	1	45	1	45	1
	MAEJIMA	1993	40	1	40	1	40	1	40	1	40	1	40	1	40	1
	03MSC	1994	40	1	40	1	40	1	40	1	40	1	40	1	40	1
	04MSC	1995	40	1	40	1	40	1	40	1	40	1	40	1	40	1
	04MSC	1995	40	1	40	1	40	1	40	1	40	1	40	1	40	1
	04MSC	1995	40	1	40	1	40	1	40	1	40	1	40	1	40	1
	06MSC	1997	40				40	1	40	1	40	1	40	1	40	1
	06MSC	1997	40				40	1	40	1	40	1	40	1	40	1
	07MSC	1999	40				40	1	40	1	40	1	40	1	40	1
	07MSC	1999	40				40	1	40	1	40	1	40	1	40	1
	09MSC	2001	40						40	1	40	1	40	1	40	1
	10MSC	2002	40								40	1	40	1	40	1
	11MSC		40									40	1	40	1	40
	12MSC		40										40	1	40	1
	12MSC		40											40	1	40
	13MSC		40												40	1
	13MSC		40												40	1
	14MSC		40													40
	14MSC		40													40
	15MSC		40													
15MSC		40														
16MSC		40														
16MSC		40														
17MSC		40														
17MSC		40														
18MSC		40														
18MSC		40														
19MSC		40														
19MSC		40														
21MSC		40														
22MSC		40														
23MSC		40														
24MSC		40														
25MSC		40														
25MSC		40														
26MSC		40														
27MSC		40														
28MSC		40														
29MSC		40														
	SUBTOTAL		33	1,460	33	1,460	35	1,540	35	1,530	33	1,440	31	1,345	29	1,215
MSO	YAEYAMA	1993	60	1	60	1	60	1	60	1	60	1	60	1	60	1
	TSUSHIMA	1993	60	1	60	1	60	1	60	1	60	1	60	1	60	1
	HACHIJYOU	1994	60	1	60	1	60	1	60	1	60	1	60	1	60	1
	2013	60														
	2014	60														
	SUBTOTAL		3	180	3	180	3	180	3	180	3	180	3	180	3	180
	TOTAL		36	1,640	36	1,640	38	1,720	38	1,710	36	1,620	34	1,525	32	1,391

SHIP BUILD LINE(4/5)

[illegible]

SHIP BUILD LINE (5/5)

	SHP	BUILT	COMPL.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006											
MSB	11-GOU	1975	10	1	10																					
	12-GOU	1975	10	1	10																					
HST	HAYASE	1971	180	1	180	1	180	1	180	1	180															
	RUKUE	1976	38	1	38	1	38	1	38	1	38	1	38	1	38											
	06MST	1997	38			1	38	1	38	1	38	1	38	1	38											
	07MST	1998	38				38	1	38	1	38	1	38	1	38											
MMC LST	SOYMA	1971	185	1	185	1	185	1	185	1	185	1	185													
	ATSUMI	1972	100	1	100	1	100	1	100	1	100	1	100													
	MOTOBU	1973	95	1	95	1	95	1	95	1	95	1	95													
	NEMURO	1977	95	1	95	1	95	1	95	1	95	1	95	1	95											
	MIURA	1975	115	1	115	1	115	1	115	1	115	1	115	1	115											
	OZJKA	1976	125	1	125	1	125	1	125	1	125	1	125	1	125											
	SATSUMA	1977	115	1	115	1	115	1	115	1	115	1	115	1	115											
	05 LST	1998	300				300	1	300	1	300	1	300	1	300											
LSU	YURA	1981	30	1	30	1	30	1	30	1	30	1	30	1	30											
	NORI	1980	30	1	30	1	30	1	30	1	30	1	30	1	30											
AGS	AZUMA	1969	185	1	185	1	185	1	185	1	185	1	185													
	KUROBE	1989	155	1	155	1	155	1	155	1	155	1	155	1	155											
	AKASHI	1969	65	1	65	1	65	1	65	1	65	1	65	1	65											
AOS	HUTAMI	1978	105	1	105	1	105	1	105	1	105	1	105	1	105											
	SUMA	1981	65	1	65	1	65	1	65	1	65	1	65	1	65											
	WAKASA	1986	105	1	105	1	105	1	105	1	105	1	105	1	105											
	H2D IXI	1991	40	1	40	1	40	1	40	1	40	1	40	1	40											
AGE	BARUDA	1992	40	1	40	1	40	1	40	1	40	1	40	1	40											
	SHIKASE	1982	170	1	170	1	170	1	170	1	170	1	170	1	170											
	ARC	1980	135	1	135	1	135	1	135	1	135	1	135	1	135											
	AS(R)	1970	100	1	100	1	100	1	100	1	100	1	100	1	100											
AGE	HUSHIDA	1985	120	1	120	1	120	1	120	1	120	1	120	1	120											
	KURIHAMA	1980	40	1	40	1	40	1	40	1	40	1	40	1	40											
	SAGAMI	1979	130	1	130	1	130	1	130	1	130	1	130	1	130											
	TOMADA	1987	140	1	140	1	140	1	140	1	140	1	140	1	140											
TV	TOKIDA	1990	140	1	140	1	140	1	140	1	140	1	140	1	140											
	HAMANA	1990	140	1	140	1	140	1	140	1	140	1	140	1	140											
	KATORI	1969	230	1	230																					
TV	KASHIMA	1986	210		1	360	1	360	1	360	1	360	1	360	1											
	TV 01	1966	210	1	210	1	210	1	210	1	210	1	210	1	210											
	TV 02	1960	210	1	210	1	210	1	210	1	210	1	210	1	210											
Total			33	3,643	31	3,753	32	3,791	34	4,129	34	4,129	32	3,879	31	3,779	29	3,414	28	3,314	27	3,219	27	3,219	26	3,104

[illegible]

APPENDIX S.
ESTIMATE OF SHIPBUILDING COST (1/7)

SS

(Real Value : 1000 Yen)

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1959	HAYASHIO	6,606,476			
1959	WAKASHIO	6,606,476	0.000		
1960	NATSUSHIO	6,674,718	0.010		0.003
1960	FUYUSHIO	6,674,718	0.000		
1961	OOSHIO	12,058,401	0.807	0.825	
1963	ASASHIO	12,367,682	0.026		
1964	HARUSHIO	11,620,773	-0.060		-0.021
1965	MICHISHIO	11,003,653	-0.053		
1966	ARASHIO	11,038,516	0.003		
1967	UZUSHIO	15,479,852	0.402	0.284	
1968	MAKISHIO	14,194,970	-0.083		
1969	ISOSHIO	14,740,710	0.038		0.064
1970	NARUSHIO	14,571,088	-0.012		
1971	KUROSHIO	13,774,589	-0.055		
1972	TAKASHIO	13,949,194	0.013		
1973	YAESHIO	20,705,002	0.484		
1975	YUUSHIO	28,987,971	0.400	0.873	
1977	MOCHISHIO	29,315,454	0.011		
1978	SETOSHIO	29,175,424	-0.005		0.008
1979	OKISHIO	27,925,058	-0.043		
1980	NADASHIO	31,173,098	0.116		
1981	HAMASHIO	31,724,905	0.018		
1982	AKISHIO	32,545,862	0.026		
1983	TAKESHIO	29,200,966	-0.103		
1984	YUKISHIO	29,739,792	0.018		
1985	SACHISHIO	30,696,036	0.032		
1986	HARUSHIO	37,402,606	0.218	1.290	
1987	NATSUSHIO	35,477,370	-0.051		
1988	HAYASHIO	35,339,722	-0.004		0.036
1989	ARASHIO	35,819,834	0.014		
1990	WAKASHIO	35,975,840	0.004		
1991	HUYUSHIO	35,479,683	-0.014		
1992	O4SS	39,879,149	0.124		
1993	O5SS	47,013,403	0.179		
AVERAGE			0.075	0.818	0.018

TREND AND ESTIMATE OF SHIPBUILDING COST(2/7)

DD

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1962	YAMAGUMO	10,110,612			
1963	MAKIGUMO	10,953,853	0.083		
1964	ASAGUMO	10,154,748	-0.073		
1965	MINEGUMO	11,023,913	0.086		
1966	NATSUGUMO	10,955,084	-0.006		0.082
1967	MURAKUMO	11,051,293	0.009		
1969	AOKUMO	11,206,156	0.014		
1971	ASAGUMO	11,025,293	-0.016		
1974	YUUGUMO	17,157,833	0.556		
1963	TAKATSUKI	14,242,918		0.409	
1964	KIKUZUKI	17,934,419	0.259		
1965	MOCHIZUKI	18,380,248	0.025		0.111
1965	NAGATSUKI	19,283,320	0.049		
1977	HATSUYUKI	32,894,496		1.310	
1978	SHIRAYUKI	30,735,065	-0.066		
1979	MINEYUKIetc(3)	32,921,674	0.071		0.031
1980	ISOYUKIetc(2)	33,277,788	0.011		
1981	YAMAYUKIetc(2)	34,437,168	0.035		
1982	SETOYUKIetc(3)	38,022,103	0.104		
1983	ASGIRI	40,359,168		0.227	
1984	YAMAGIRIetc(3)	37,258,776	-0.077		
1985	HAMAGIRIetc(3)	38,995,939	0.047		-0.013
1986	UMIGIRI	38,674,024	-0.008		
1991	HARUSAME	54,485,316		0.350	
1992	04DD	58,593,396	0.075		0.075
AVERAGE			0.059	0.574	0.057

DDG

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1960	AMATSUKAZE	14,215,567			
1971	TACHIKAZE	31,198,660		1.195	
1973	ASAKAZE	40,308,987	0.292		
1978	SAWAKAZE	46,479,217	0.153		0.223
1981	HATAKAZE	62,670,571		0.348	
1983	SHIMAKAZE	64,964,160	0.037		0.037
1988	KONGOU	113,380,204		0.745	
1990	KIRISHIMA	116,951,534	0.031		
1991	03DDG	109,987,409	-0.060		-0.020
1993	05DDG	106,492,577	-0.032		
AVERAGE			0.070	0.763	0.080

TREND AND ESTIMATE OF SHIPBUILDING COST (3/7)

DDH

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1968	HARUNA	20,532,027			
1970	HIEI	20,746,106	0.010		0.010
1975	SHIRANE	47,666,371		1.322	
1976	KURAMA	48,869,649	0.025		0.025
AVERAGE			0.018	1.322	0.018

MSC

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1976	HATSUSHIMA	5,378,024			
1977	NINOSHIMA	5,234,636	-0.027		
1978	ENOSHIMA	4,627,083	-0.116		
1979	OOSHIMA	4,583,425	-0.009		
1980	YAKUSHIMA	4,586,628	0.001		
1982	HAHAJIMA	4,723,656	0.030		
1983	NUWAJIMA	4,610,432	-0.024		
1984	KAMISHIMA	4,441,814	-0.037		
1985	OGISHIMA	4,755,414	0.071		
1986	YURISHIMA	4,739,064	-0.003		
1987	AWASHIMA	5,070,284	0.070		
1988	UWAJIMA	6,338,990		0.179	
1990	TSUKISHIMA	6,484,507	0.023		
1991	MAEJIMA	7,046,032	0.087		0.055
AVERAGE			0.005	0.179	0.025

MSO

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1989	YAEYAMA	15,168,060			
1990	HACHIJYOU	15,996,747	0.055	0.055	0.055

MST

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1969	SOYA	7,520,426			

LST

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1970	ATSUMI	4,228,878			
1972	MOTOBU	3,809,858	-0.099		
1975	NEMURO	4,360,682	0.145		0.023
1972	MIURA	6,164,231		0.458	
1973	OJIKA	4,991,647	-0.190		
1974	SATSUMA	5,349,459	0.072		-0.059
AVERAGE			-0.018	0.458	-0.018
1993	05LST	45,328,886		6.354	6.354

TREND AND ESTIMATE OF SHIPBUILDING COST (4/7)

AOE

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1976	SAGAMI	15,316,700			
1984	TOWADA	18,901,620		0.234	
1987	TOKIWA (2)	19,575,901	0.036		0.036
AVERAGE			0.036	0.234	0.036

ASR

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1981	CHIYODA	18,792,756			

ATS

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1967	AZUMA	4,617,798			
1986	KUROBE	14,300,585	2.097		2.097

AOS

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1989	HIBIKI	13,590,775			
1990	HARIMA	13,451,779	-0.010		-0.010

AGS

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1967	AKASHI	2,848,478			
1979	SUMA	5,523,701		0.939	
1976	HUTAMI	9,401,465		0.702	
1983	WAKASA	9,044,673	-0.038		-0.038
AVERAGE			-0.038	0.821	-0.038

ARC

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1977	MUROTO	16,949,896			

ASE

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1992	ASUKA	25,079,872			

TV

Fiscal Year	NAME	REAL VALUE	UP RATE		AVE. UP RATE
1992	KASHIMA	30,873,422			

TREND AND ESTIMATE OF SHIPBUILDING COST (5/7)

SS

1	67,997,938
2	69,221,901
3	70,467,895
4	71,736,317
5	73,027,571
6	74,342,067
7	75,680,224
8	77,042,468
9	78,429,233
10	79,840,959
TOTAL	737,786,571
AVE.	73,778,657

Note: No1=HARUSHIO*1.818
Others: No.1*1.018^(n-1)

SSBN

1	376,831,180
2	392,281,259
3	408,364,790
4	425,107,747
TOTAL	1,602,584,976
AVE.	400,646,244

Note: No1='93SSN(USA)*1.041^17
Others:No.1*1.041^(n-1)
93 SSN=1,903.2(\$M)

1.041 is average of AVE. UP RATE
of SS, DD, DDG, DDH, MSC, MSO, AOE

DDH

1	110,681,313
2	112,673,577
TOTAL	223,354,891
AVE.	111,677,445

Note: No1=SHIRANE*2.322
No.2 : No.1*1.018

DDV

1	237,598,474
2	247,340,012
TOTAL	484,938,486
AVE.	242,469,243

Note: No1='93LHD(USA)*1.041^17
No.2: No.1*1.041
'93LHD=1,200(\$M)

DDG

1	199,889,300
2	215,880,444
3	233,150,879
4	251,802,949
5	271,947,185
TOTAL	1,172,670,757
AVE.	234,534,151

Note: No1=KONGOU*1.763
Others : No.1*1.080^(n-1)

DD(5,000TON)

1	85,759,887
2	90,648,201
3	95,815,148
4	101,276,612
5	107,049,379
6	113,151,193
7	119,600,811
8	126,418,058
9	133,623,887
TOTAL	973,343,177
AVE.	108,149,242

Note: No1=HARUSAME*1.574
Others : No.1*1.057^(n-1)

TREND AND ESTIMATE OF SHIPBUILDING COST (6/7)

DD(3,000TON)

1	51,775,937
2	54,727,165
3	57,846,614
4	61,143,870
5	64,629,071
6	68,312,928
7	72,206,765
8	76,322,551
9	80,672,936
10	85,271,293
11	90,131,757
12	95,269,267
13	100,699,616
14	106,439,494
15	112,506,545
16	118,919,418
TOTAL	1,296,875,226
AVE.	81,054,702

Note: No1=HATSUYUKI*1.574
Others : No.1*1.057^(n-1)

MSO

1	44,256,721
2	46,690,840
3	49,258,837
TOTAL	140,206,398
AVE.	46,735,466

Note: No1=YAHEYAMA*1.055^20
Others : No.1*1.055^(n-1)

LST(4,000TON)

1	17,974,898
2	18,388,320
3	18,811,252
4	19,243,910
5	19,686,520
6	20,139,310
TOTAL	114,244,210
AVE.	19,040,702

Note: No1=MIURA*2*1.458
Others : No.1*1.023^(n-1)

MSC

1	7,473,669
2	7,660,511
3	7,852,024
4	8,048,324
5	8,249,532
6	8,455,771
7	8,667,165
8	8,883,844
9	9,105,940
10	9,333,589
11	9,566,928
12	9,806,102
13	10,051,254
14	10,302,536
15	10,560,099
16	10,824,101
17	11,094,704
18	11,372,072
19	11,656,373
20	11,947,783
21	12,246,477
22	12,552,639
TOTAL	215,711,437
AVE.	9,805,065

Note: No1=UWAJIMA*1.179
Others:No.1*1.025^(n-1)

AOE

1	29,155,749
2	30,205,356
3	31,292,749
TOTAL	90,653,853
AVE.	30,217,951

Note: No1=TOWADA*1.25*1.234
Others:No.1*1.036^(n-1)

ATF

1	89,750,618
2	93,430,393
TOTAL	183,181,011
AVE.	91,590,506

Note: No1=05LST*1.041^17
Others:No.1*1.041^(n-1)

TREND AND ESTIMATE OF SHIPBUILDING COST(7/7)

ASR

1	62,735,355
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Note: No1=CHIYODA*1.041^30

ATS

1	37,512,094
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Note: No1=KUROBE*1.041^24

ATSS

1	33,998,969
2	34,610,950
TOTAL	68,609,919
AVE.	34,304,960

Note: No1=HARUSHIO*1.818/2
No.2: No.1*1.018

AOS

1	30,356,997
2	31,601,634
TOTAL	61,958,632
AVE.	30,979,316

Note: No1=HIBIKI*1.041^20
No.2: No.1*1.041

AGS

1	17,110,666
2	17,812,204
TOTAL	34,922,870
AVE.	17,461,435

Note: No1=HUTAMI*1.82
No.2: No.1*1.041

ARC

1	42,710,417
2	44,461,545
TOTAL	87,171,962
AVE.	43,585,981

Note: No1=MUROTO*1.041^23
No.2: No.1*1.041

ASE

1	51,693,799
---	------------

Note: No1=ASUKA*1.041^18

TV

1	63,635,271
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Note: No1=1992 TV*1.041^18

Source : Kaijoeitai Yosan Jimuteiyo (Kaijobakuryokanbu)

APPENDIX T.
ESTIMATE OF AIRCRAFT PROCURING FLOW(1/3)

A/C	NUMBER	ACQU.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
VP	3	1981																							
	5	1982																							
	5	1983																							
	5	1984																							
	7	1985																							
	6	1986																							
	8	1987																							
	10	1988																							
	10	1989																							
	9	1990																							
	9	1991																							
	10	1992																							
	8	1993																							
	2	1994																							
	1	1995																							
	1	1996																							
	1	1997																							

NUMBER	ACQU.	2018	2019	2020
3	1981			
5	1982			
5	1983			
5	1984			
7	1985			
6	1986			
8	1987			
10	1988			
10	1989			
9	1990			
9	1991			
10	1992			
8	1993			
2	1994			
1	1995			
1	1996			
1	1997			

A/C	NUMBER	ACQU.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
EP	1	1990																							
	1	1991																							
	1	1996																							
	1	1997																							
	1	1999																							

NUMBER	ACQU.	2018	2019	2020
1	1990			
1	1991			
1	1996			
1	1997			
1	1999			

A/C	NUMBER	ACQU.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
SH	2	1989																							
	12	1991																							
	12	1992																							
	11	1993																							
	5	1994																							
	7	1995																							
	4	1996																							
	5	1997																							
	6	1998																							

NUMBER	ACQU.	2018	2019	2020
2	1989			
12	1991			
12	1992			
11	1993			
5	1994			
7	1995			
4	1996			
5	1997			
6	1998			

A/C	NUMBER	ACQU.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
MH	4	1989																							
	2	1990																							
	4	1992																							
	1	1994																							

NUMBER	ACQU.	2018	2019	2020
4	1989			
2	1990			
4	1992			
1	1994			

ESTIMATED OF AIRCRAFT PROCURING FLOW(2/3)

A/C	NUMBER	ACQU.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
US	1	1982																								
	1	1986																								
	1	1988																								
	1	1990																								
	1	1993																								
	1	1994																								
	1	1995																								
	1	1997																								

NUMBER	ACQU.	2019	2020
1	1982		
1	1986		
1	1988		
1	1990		
1	1993		
1	1994		
1	1995		
1	1997		

A/C	NUMBER	ACQU.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
UH	3	1992																								
	3	1994																								
	2	1995																								
	2	1996																								
	2	1997																								
	1	1998																								
	1	1999																								

NUMBER	ACQU.	2019	2020
3	1992		
3	1994		
2	1995		
2	1996		
2	1997		
1	1998		
1	1999		

A/C	NUMBER	ACQU.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
U36	1	1986																								
	1	1987																								
	1	1990																								
	1	1991																								
	1	1994																								

NUMBER	ACQU.	2019	2020
1	1986		
1	1987		
1	1990		
1	1991		
1	1994		

A/C	NUMBER	ACQU.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
UP-3	1	1998																								
	1	1999																								

NUMBER	ACQU.	2019	2020
1	1998		
1	1999		

A/C	NUMBER	ACQU.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
T-5	3	1988																								
	3	1989																								
	2	1990																								
	7	1991																								
	9	1992																								
	5	1993																								
	3	1994																								
	2	1997																								

NUMBER	ACQU.	2019	2020
3	1988		
3	1989		
2	1990		
7	1991		
9	1992		
5	1993		
3	1994		
2	1997		

ESTIMATE OF AIRCRAFT PROCURING FLOW (3/3)

A/C	NUMBER	ACQU.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
TC-90	1	1975																							
	1	1978																							
	1	1979																							
	2	1980																							
	2	1981																							
	4	1982																							
	3	1983																							
	2	1984																							
	1	1985																							
	5	1993																							

NUMBER	ACQU.	2018	2019	2020
1	1975			
1	1978			
1	1979			
2	1980			
2	1981			
4	1982			
3	1983			
2	1984			
1	1985			
5	1993			

A/C	NUMBER	ACQU.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
LC-90	1	1988																							
	2	1990																							
	2	1991																							

NUMBER	ACQU.	2018	2019	2020
1	1988			
2	1990			
2	1991			

A/C	NUMBER	ACQU.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
OH-6D	2	1983																							
	1	1984																							
	2	1985																							
	2	1988																							
	2	1990																							
	1	1992																							
	3	1996																							

NUMBER	ACQU.	2018	2019	2020
2	1983			
1	1984			
2	1985			
2	1988			
2	1990			
1	1992			
3	1996			

A/C	NUMBER	ACQU.	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NP-3	1	1994																							

NUMBER	ACQU.	2018	2019	2020
1	1994			

Note : This flow is made by following assumption of life of aircraft.
Fixed Wing : 20 Years
Helicopter : 15 Years

Source : KANTEI TO KOKUKI SYU (HEISEI 6 NENDO BAN) (Asagumo Shinbunsha)

APPENDIX U.
TREND AND ESTIMATE OF AIRCRAFT PROCURING COST(1/4)

VP (P-3C) (Real Value : 1000 Yen)

Fiscal Year	REAL VALUE	UP RATE
1978	8,166,289	-
1980	9,963,535	0.220
1982	11,597,113	0.164
1983	11,165,871	-0.037
1984	11,076,263	-0.008
1985	11,256,776	0.016
1986	10,386,263	-0.077
1987	9,372,614	-0.098
1988	9,082,350	-0.031
1989	8,841,221	-0.027
1990	9,603,396	0.086
1991	9,148,061	-0.047
1992	10,562,543	0.155
1993	12,288,140	0.163
AVE.		0.037

EP(EP-3)

Fiscal Year	REAL VALUE	UP RATE
1987	11,727,578	-
1988	10,550,401	-0.100
1992	12,667,516	0.201
1993	12,698,413	0.002
AVE.		0.034

SH (SH-60J)

Fiscal Year	REAL VALUE	UP RATE
1988	4,343,712	-
1989	4,370,252	0.006
1990	4,541,140	0.039
1991	4,611,005	0.015
1992	4,635,162	0.005
1993	5,159,092	0.113
AVE.		0.036

MH(MH-53E)

Fiscal Year	REAL VALUE	UP RATE
1986	4,871,008	-
1987	4,354,679	-0.106
1989	4,056,597	-0.068
1991	5,214,284	0.285
AVE.		0.037

US(US-1A)

Fiscal Year	REAL VALUE	UP RATE
1977	6,305,290	-
1978	6,028,043	-0.044
1979	6,137,966	0.018
1980	6,211,311	0.012
1983	5,104,405	-0.178
1984	5,199,249	0.019
1986	5,523,479	0.062
1991	6,350,332	0.150
1992	6,072,523	-0.044
1993	6,559,652	0.080
AVE.		0.008

UH(UH-60J)

Fiscal Year	REAL VALUE	UP RATE
1989	2,891,633	-
1991	3,702,335	0.280
1992	3,969,774	0.072
1993	3,931,563	-0.010
AVE.		0.114

U-36A

Fiscal Year	REAL VALUE	UP RATE
1984	3,735,075	-
1985	3,918,357	0.049
1987	2,720,724	-0.306
1988	2,627,122	-0.034
1989	2,361,682	-0.101
1992	1,708,609	-0.277
AVE.		-0.134

TREND AND ESTIMATE OF AIRCRAFT PROCURING COST (2/4)

UP(UP-3)

Fiscal Year	NOMINAL VALUE	UP RATE
1994	14,808,000	-
1995	13,611,000	-0.081
AVE.	14,209,500	-0.081

T-5

Fiscal Year	REAL VALUE	UP RATE
1990	380,652	-
1991	397,688	0.045
1992	392,486	-0.013
1993	412,189	0.050
AVE.		0.027

TC-90

Fiscal Year	REAL VALUE	UP RATE
1973	413,526	-
1974	409,057	-0.011
1977	478,080	0.169
1978	469,515	-0.018
1979	387,242	-0.175
1980	420,635	0.086
1981	457,303	0.087
1982	531,867	0.163
1983	593,269	0.115
1984	602,406	0.015
1986	585,912	-0.027
1992	513,558	-0.123
AVE.		0.026

LC-90

Fiscal Year	REAL VALUE	UP RATE
1987	523,946	-
1989	449,431	-0.142
1990	495,558	0.103
AVE.		-0.020

OH-6D

Fiscal Year	REAL VALUE	UP RATE
1982	212,639	-
1983	260,801	0.226
1984	230,866	-0.115
1987	227,771	-0.013
1989	194,379	-0.147
1992	228,344	0.175
AVE.		0.025

NP-3

Fiscal Year	REAL VALUE	UP RATE
1991	7,631,391	-

AVERAGE UP RATE

P-3C	0.037
EP-3	0.034
SH-60J	0.036
MH-53E	0.037
US-1A	0.008
UH-60J	0.114
T-5	0.027
TC-90	0.026
OH-6D	0.025
AVE.	0.038

Note: Negative up rates
are ignored

TREND AND ESTIMATE OF AIRCRAFT PROCURING COST (3/4)

VP

1~ 9	23,165,472
10~18	24,045,760
19~28	24,959,499
29~36	25,907,960
37~38	26,892,463
39	27,914,376
40	28,975,123
41	30,076,177
TOTAL	1,022,510,369
AVE.	24,939,277

Note: No.1~9=P-3C(1993)*1.038¹⁷
Others=No.1*1.038⁽ⁿ⁻¹⁾

SH(SH-60J)

1~ 7	9,725,866
8~11	10,095,449
12~16	10,479,076
17~22	10,877,281
23~24	11,290,618
TOTAL	248,703,158
AVE.	10,362,632

Note: No.1~7=SH-60J(1993)*1.038¹⁷
Others=No.1*1.038⁽ⁿ⁻¹⁾

US(US-1A)

1	14,901,246
2	15,467,493
3	16,055,258
TOTAL	46,423,997
AVE.	15,474,666

Note: No.1=US-1A(1993)*1.038²²
Others=No.1*1.038⁽ⁿ⁻¹⁾

EP (EP-3)

1	23,938,915
2	24,848,593
3	25,792,840
4	26,772,968
5	27,790,341
TOTAL	129,143,657
AVE.	25,828,731

Note: No.1=EP-3(1993)*1.038¹⁷
Others=No.1*1.038⁽ⁿ⁻¹⁾

MH(MH-53E)

1~ 4	13,247,335
5~ 6	13,750,734
TOTAL	80,490,808
AVE.	13,415,135

Note:
No.1=MH-53E(1991)*1.038²⁵
Others=No.1*1.038⁽ⁿ⁻¹⁾

UH(UH-60J)

1~ 2	7,411,741
3~ 4	7,693,387
5~ 6	7,985,736
7	8,289,194
8	8,604,183
TOTAL	63,075,107
AVE.	7,884,388

Note:
No.1~2=UH-60J(1993)*1.038¹⁷
Others=No.1*1.038⁽ⁿ⁻¹⁾

TREND AND ESTIMATE OF AIRCRAFT PROCURING COST (4/4)

U-36A

1	3,221,052
2	3,343,452
3	3,470,503
TOTAL	10,035,006
AVE.	3,345,002

Note: No.1=U-36A(1992)*1.038¹⁷
Others

T-5

1~ 2	777,054
3~ 9	806,582
10~18	837,233
19~23	869,047
24~26	902,071
27~28	936,350
TOTAL	23,659,429
AVE.	844,980

Note: No.1-2=T-5(1993)*1.038¹⁷
Others=No.1*1.038⁽ⁿ⁻¹⁾

LC-90

1~ 2	1,044,820
3~ 4	1,084,523
TOTAL	4,258,687
AVE.	1,064,672

Note: No.1-2=LC-90(1990)*1.038²⁰
Others=No.1*1.038⁽ⁿ⁻¹⁾

NP-3

1	15,500,775
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Note: No.1=NP-3(1991)*1.038¹⁹

VC

1	8,744,017
2	9,076,290
3	9,421,189
4	9,779,194
TOTAL	37,020,691
AVE.	9,255,173

Note: No.1='92 C-130*1.038¹⁸
Others=No.1*1.038⁽ⁿ⁻¹⁾
'92 C-130=4,468(Yen M)

UP(UP-3)

1	29,958,900
2	31,097,338
TOTAL	61,056,239
AVE.	30,528,119

Note: No.1=UP-3(1994)*1.038²⁰
Others=No.1*1.038⁽ⁿ⁻¹⁾

TC-90

1~ 5	1,004,944
6	1,043,132
7	1,082,771
8	1,123,916
9~10	1,166,625
TOTAL	10,607,789
AVE.	1,060,779

Note: No.1=TC-90(1992)*1.038¹⁸
Others=No.1*1.038⁽ⁿ⁻¹⁾

OH-6D

1~ 2	446,830
3	463,809
4~ 5	481,434
6~ 7	499,728
8~ 9	518,718
TOTAL	4,357,229
AVE.	484,137

Note: No.1=OH-6D(1992)*1.038¹⁸
Others=No.1*1.038⁽ⁿ⁻¹⁾

VFA

1~ 5	8,805,720
6~10	9,140,337
11~15	9,487,670
16~20	9,848,202
21~25	10,222,433
26~30	10,610,886
31~35	11,014,100
36~40	11,432,635
TOTAL	402,809,919
AVE.	10,070,248

Note:
No.1-5='92 AV-8B(USA)*1.038¹⁸
Others=No.1*1.038⁽ⁿ⁻¹⁾
'92 AV-8B=45(\$M)

Source : Kaijojeitai Yosan Jimuteiyo (Kaijobakuryokanbu)

LIST OF REFERENCE

1. Defense Agency, Defense of Japan 1994, Defense Agency, Tokyo, 1994.
2. Defense Agency, Defense of Japan 1993, Defense Agency, Tokyo, 1993.
3. Defense Agency, Defense of Japan 1992, Defense Agency, Tokyo, 1992.
4. Defense Agency, Defense of Japan 1991, Defense Agency, Tokyo, 1991.
5. Defense Agency, Defense of Japan 1990, Defense Agency, Tokyo, 1990.
6. Defense Agency, Defense of Japan 1989, Defense Agency, Tokyo, 1989.
7. Kaijobakuryoukanbu, Kaijojieitai Yosan Jimuteiyo, Kaijojieitai, Tokyo, 1994.
8. Kantei To Kokuki Shu, Kaijojieitai Shinbunsha, Tokyo, 1994.
9. Boei Handbook, Asagumo Shinbunsha, Tokyo, 1994.
10. Boei Handbook, Asagumo Shinbunsha, Tokyo, 1993.
11. Boei Handbook, Asagumo Shinbunsha, Tokyo, 1992.
12. Boei Handbook, Asagumo Shinbunsha, Tokyo, 1991.
13. Boei Handbook, Asagumo Shinbunsha, Tokyo, 1990.
14. Boei Handbook, Asagumo Shinbunsha, Tokyo, 1989.
15. Boei Handbook, Asagumo Shinbunsha, Tokyo, 1988.
16. Boei Handbook, Asagumo Shinbunsha, Tokyo, 1987.
17. Boei Handbook, Asagumo Shinbunsha, Tokyo, 1986.
18. Boei Handbook, Asagumo Shinbunsha, Tokyo, 1985.
19. Nihon Kokusei Zue 1994/95, Kokuseisha, Tokyo, 1994
20. Research Institute for Peace and Security, Asian Security 1993-1994.
21. Research Institute for Peace and Security, Asian Security 1994-1995.

22. International institute for Strategic Studies, *The Military Balance 1993-1994*, BRASSEY'S, London, 1993.
23. Jane's Information Group, *Jane's Fighting Ship 1994-1995*, Butler and Tanner Ltd., London, 1994.
24. Jane's Information Group, *Jane's Fighting Ship 1993-1994*, Butler and Tanner Ltd., London, 1993.
25. Jane's Information Group, *Jane's Fighting Ship 1992-1993*, Butler and Tanner Ltd., London, 1992.
26. Jane's Information Group, *Jane's Fighting Ship 1991-1992*, Butler and Tanner Ltd., London, 1991.
27. Jane's Information Group, *Jane's Fighting Ship 1990-1991*, Butler and Tanner Ltd., London, 1990.
28. Jane's Information Group, *Jane's Fighting Ship 1989-1990*, Butler and Tanner Ltd., London, 1989.
29. Jane's Information Group, *Jane's Fighting Ship 1988-1989*, Butler and Tanner Ltd., London, 1988.
30. Jane's Information Group, *Jane's Fighting Ship 1987-1988*, Butler and Tanner Ltd., London, 1987.
31. Jane's Information Group, *Jane's Fighting Ship 1986-1987*, Butler and Tanner Ltd., London, 1986.
32. Jane's Information Group, *Jane's Fighting Ship 1985-1986*, Butler and Tanner Ltd., London, 1995.
31. Jane's Information Group, *Jane's Fighting Ship 1984-1985*, Butler and Tanner Ltd., London, 1984.
32. Edward A. Olsen, *U.S.- Japan strategic reciprocity*, Hoover Institution Press, Stanford, California, 1985.
33. Advisory Group on Defense Issue, *The Modality of the Security and Defense Capability of Japan- The outlook for the 21st Century-*, Tokyo, 1994.
34. U.S. security challenges in transition, *Strategic Assessment 1995*, Washington, D.C., 1995.

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